Hydrographs for typical points on several principal rivers are shown on Chart I. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.

TABLE 2.—*Floods in the East Gulf States during August, 1916.*

River.	Station.	Flood stage.	Above flood stage.		Crest.	
			From—	To—	Stage.	Date.
		Feet.			*Feet.*	
West Pearl	Pearl River, La	12	1	7	14.2	¹26
Tombigbee	Demopolis, Ala	39	1	2	66.2	¹16
Flint	Bainbridge, Ga	25			23.9	1
Ocmulgee	Abbeville, Ga	11	1	4	14.1	¹28
Do	do	11	9	10	11.5	9
Do	Lumber City, Ga	15	1	1	16.2	¹30
Do	Macon, Ga	18			16.6	3

¹ Occurred in July.

TABLE 3.—*Floods in the South Atlantic States during August, 1916.*

River.	Station.	Flood stage.	Above flood stage.		Crest.	
			From—	To—	Stage.	Date.
		Feet.			*Feet.*	
Edisto	Edisto, S. C	6	1	3	6.8	¹31
Saluda	Chappells, S. C	14			12.4	2
Santee	Rimini, S. C	12	1	15	35.8	¹20
Do	Ferguson, S. C	12	1	19	24.7	¹22
Black	Kingstree, S. C	12	1	5	15.5	¹17
Lynches	Effingham, S. C	14	1	4	15.0	3
Waccamaw	Conway, S. C	7	1	14	9.2	1
Cape Fear	Elizabethtown, N. C	20	1	1	27.4	¹28

¹ Occurred in July.

TABLE 4.—*Floods in various other rivers during August, 1916.*

River.	Station.	Flood stage.	Above flood stage.		Crest.	
			From—	To—	Stage.	Date.
		Feet.			*Feet.*	
Holston, North Fork	Mendota, Va	8	16	16	14.0	16
Columbia	Marcus, Wash	24	1	6	33.8	¹5
Do	Vancouver, Wash	15			14.8	1
Willamette	Portland, Oreg	15			14.3	1

¹ Occurred in July.

FLOODS IN THE EAST GULF AND SOUTH ATLANTIC STATES, JULY, 1916.

By ALFRED J. HENRY, Professor in Charge.

[Dated: River and Flood Division, Weather Bureau, Sept. 20, 1916.]

The immediate cause of the destructive floods in the East Gulf and South Atlantic States was the movement over those States of two tropical cyclones, whose approximate paths are shown in figure 1 (XLIV-93).[1]

The first of these storms passed inland over the Mississippi coast during the night of July 5–6, 1916, and moved slowly a little west of north to about the thirty-second parallel of north latitude, thence it followed a somewhat sinuous course a little east of north for several days, finally by the morning of July 11 it had become a disturbance of such feeble intensity that its future course could not be followed. In its movement over the State, which occupied practically all of five days, rain fell almost continuously; in some parts of the State, as will appear

from the daily rainfall charts which accompany this report, figures 3–14 inclusive, the rainfall was extraordinarily heavy. As this storm drifted over northern Alabama and eastern Tennessee its sphere of influence extended across the Appalachians into the Carolinas, the mountain districts of which received heavy rains.

Almost immediately a second tropical cyclone moved in from the Atlantic, passing over the coast of South Carolina on the morning of July 14, 1916. During that day torrential rains fell on the lowlands a short distance northeast of Charleston, attended by high winds. By the morning of the 15th the center of the storm had reached western North Carolina. Beginning in the afternoon of that day and continuing for 24 hours, unprecedented rains fell over the eastern slope of the Blue Ridge and also in the valley of the French Broad as it flows northward between the several parallel ranges of the Blue Ridge. The run-off from these rains by reason of the saturated condition of the soil must have been 80 or 90 per cent of the precipitation. Naturally floods hitherto unprecedented occurred in both the Tennessee and Atlantic drainage, as will appear later in this report.

When tropical cyclones move into extratropical latitudes they generally retain some of the characteristics which differentiate them in the beginning from extratropical cyclones. The precipitation of a tropical cyclone is torrential in character and rather uniformly distributed around the center of the storm. In extratropical cyclones the precipitation is not uniformly distributed about the center, but the maximum amount is generally found over the southeastern quadrant some little distance from the center. A common characteristic of extratropical cyclones is that whenever the rate of progression of the storm is retarded the cumulative precipitation in its path generally exceeds the so-called excessive rate.

Whether the extraordinary rains of the East Gulf and South Atlantic States were due to the fact that tropical storms passed over them, or whether the rains would not have been equally heavy had the storm been of extratropical origin is not a question of material importance. The writer is inclined to the opinion that the distribution of the precipitation in connection with these two storms is such as might be expected from an extratropical cyclone following the identical paths pursued by the tropical cyclones shown on figure 1. This belief is strengthened by the fact that the floods of August, 1908, in South Atlantic States, floods that are generally recognized as being hitherto the most severe of record in those States, were due to a rather feeble extratropical cyclone that advanced slowly from southern Alabama on August 24, 1908, to the Atlantic off Cape Hatteras on August 27.

The record of rainfall in connection with both storms is included in Table 3 and the areal distribution is illustrated in a series of charts, figures 2–17. The scale of the charts is about 110.5 miles to an inch. It is a matter of regret that it was not possible to present charts on a much larger scale. A casual inspection of these charts will show that during the early period of both storms there were isolated areas, or islands, of exceptionally heavy rains within a general area of moderate rains. Such islands appear on the chart for the 6th, figure 3 for example, in southeastern Mississippi, south-central Alabama, and extreme northwestern Florida. The island in southeastern Mississippi is the greatest in superficial extent, covering parts, if not all of the counties of George, Perry, Greene, and Jones in Mississippi, and portions of Washington and Mobile Counties in Alabama.

Figure 2 is a special chart prepared to illustrate on a scale of about 35 miles to the inch the distribution of precipitation for the 4 days, July 5–8, 1916, in southeastern Mississippi. That portion of the State is well covered with rainfall stations and the delineation of the areas of heavy precipitation is not difficult. Across the border in Alabama the reporting stations are not nearly so numerous; such as are available, however, show that the intensity of the rains rapidly diminished with distance from the border (see the small scale maps, figs. 3, 4, and 5). The center of the cyclone on the 6th was northwest of the island of heavy precipitation in southeastern Mississippi and distant therefrom not more than 100 miles. No explanation is at hand as to the cause of these three separate and apparently distinct regions of heavy precipitation separated from each other by regions of lesser precipitation. In this connection it is interesting to note that previous torrential rains in southeastern Mississippi generally have been associated with extra-tropical cyclones and that the month of greatest frequency appears to be April.

The record flood in the rivers of eastern Mississippi occurred in April, 1900, and was due to a period of about 60 consecutive hours of rain. Some of the 24-hour amounts in April, 1900, are Bay St. Louis, 8.77 inches; Canton, 5.25 inches; Natchez, 6.75 inches; Port Gibson, 7.64 inches; Meridian, 6.85 inches. At the last-named station 10.57 inches of rain fell from 12:50 p. m., April 15, to 8:10 a. m., April 17, 1900, a period of 43 hours and 20 minutes. These long-continued rains were due to the presence of an extra-tropical cyclone in northern Oklahoma and its slow movement thence to the upper Lake region. The movement of that cyclone as indicated induced southeast winds over Mississippi and adjoining States. In a general way the rainfall diminishes with distance from the coast line, but there are notable exceptions that lead us to conclude that distance from the coast line is not the controlling factor. In the heavy rains of April, 1900, and again in July, 1916, the islands of heavy rainfall were situated not on the coast but some little distance inland. During the continuance of the heavy rains in George, Greene, and Jones counties, Miss., in July, 1916, the rainfall along the Gulf coast not more than 50 miles distant was less than half as much, the average of three stations being 4.92 inches.

On the succeeding day, July 7, the center of the cyclone advanced about 50 miles in an east-by-north direction. On this day heavy rains fell over the watershed of the Black Warrior River with southeast to south winds; the greatest 24-hour precipitation, 11.2 inches, occurred, however, in the Coosa River watershed at Clanton in Chilton County a little to the southeast. Goodwater in the adjoining county to the eastward also recorded heavy precipitation, thus establishing a second area of heavy rains to the southeast of the storm center.

On the following day, July 8, with the storm center apparently over west-central Alabama, a fairly large area of 24-hour rains in excess of 8 inches (8 to 12 inches), is noted over southeastern Alabama and in the lower Chattahoochee watershed. Some of the recorded amounts are: Alaga, Ala., 12.7 inches; Eufala, Ala., 10.8 inches; Ozark, Ala., 9.0 inches; Blakely, Ga., 9.9 inches; Fort Gaines, Ga., 9.0 inches; and De Funiak Springs, Fla., 10.8 inches. (See fig. 5.). Roughly the area covered by a rainfall of 8 inches and over was about 4,945 square miles and by the area of 4 inches and over was about 17,582 square miles.

On the succeeding day, July 9, the rains diminished in intensity over Alabama and low-lying regions but a considerable increase was noted in the mountain districts of the southern Appalachians. With the gradual filling up of the cyclone that was the original cause of the rains, the amounts which fell on the 10th were not sufficient in themselves to cause floods but they served to saturate the soil and to keep the streams at moderately high stages and thus to prepare the way for serious floods as soon as the downpour of the second storm was precipitated upon them.

This storm like its predecessor was presumably of tropical origin, although but little information as to the position of its origin is available. It passed inland close to Charleston, S. C., on the morning of July 14, 1916, moved thence slowly northeastward and dissipated over the mountains of western North Carolina on the 16th.

The rainfall of this storm also was irregularly distributed about the storm center. On the 14th heavy rains fell northwest of Charleston in Berkeley, Georgetown, and Dillon counties. (See Table 1 and the record for Pinapolis, Oaks, and Dillon, S. C.) The fall in Dillon County was not so heavy as in Berkeley County. On the succeeding day, July 15, when the storm center was over the mountainous region of western North Carolina, heavy rains continued over the low-lying regions of the northeastern part of South Carolina, especially in the line of counties along the right bank of the Great Pee Dee River—viz, from north to south, Chesterfield, Darlington, Florence, and Williamsburg (see the rainfall map of July 14, fig. 12). On this same date, 14th, heavy rains, 8 to 10 inches, were also recorded in western North Carolina at five stations. The climax in the intensity of the rains was not reached until two days later on July 16, at a time when the cyclonic disturbance was not noticeable on the daily maps of the Weather Bureau.

Beginning during the afternoon of the 15th and continuing for 24 hours the rains in the mountain districts of North Carolina were extraordinarily heavy. At a special orchard station maintained at Altapass in the southeastern corner of Mitchell County, N. C. (altitude 2,625 feet above mean sealevel), an actual measurement of 19.32 inches of rain in 24 hours was recorded in an 8-inch standard raingage. The measurement was made at 6 p. m., July 16, 1916. According to the observer, Mr. J. S. Bowen, between 2 p. m. Saturday and 2 p. m. Sunday, 16th, the rainfall here amounted to 19.32 inches as measured on the 16th, and about 2.90 inches of the rainfall measured on the afternoon of the 15th fell after 2 p. m. of that day, hence the 24-hour rainfall, 2 p. m. 15th until 2 p. m. the 16th, was about 22.22 inches. The environment of this station is as follows:[2]

The station at Altapass is at the head of a ravine about 8 miles in length that leads west of north over a gap in the main range of the Blue Ridge Mountains. The gage is on the main semicircular slope and about 300 feet below the crest of the gap. The ravine is several miles in width at the base but gradually narrows to less than a half mile at the crest. This gap is the dividing line of the watershed of the Catawba (Santee) and the North Toe (Tennessee) Rivers. The general direction of the range is from northeast to northwest, but at this point it forms a semicircle facing south-southeast. The altitude increases in both directions to such mountains as Grandfather (5,964 feet), at a distance of 10 miles to the northeast, and to Mount Mitchell (6,711 feet), about 15 or 20 miles to the southwest.

The rainfall at Altapass Inn, about 1 mile from the orchard station and on the west side of the gap at about the same elevation, was also measured, the amount being 1.52 inches less than on the east side of the gap. Twenty miles to the westward, as at Cane River, Yancey County (elevation unknown), the 48-hour fall diminished to 3.32 inches, as compared with 23.22 inches at Altapass. Total

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[2] Manuscript report of Meteorologist L. A. Denson.

24-hour falls of more than 10 inches were recorded in the extreme western portion of Caldwell County on the eastern slope of the Blue Ridge, about 15 miles distant from Altapass. Torrential rains also fell in Avery County, immediately west of Caldwell County, and a second area of torrential rains is noted in western North Carolina; in the watershed of the French Broad at the stations of Blantyre, Brevard, and Hendersonville; in Transylvania and Henderson Counties; also in Macon County, in the extreme southwestern part of the State, where 9.92 inches were recorded at Highlands. It therefore appears that there were two distinct regions of torrential rains in western North Carolina on the 15th–16th—one in Mitchell, Avery, and Caldwell counties, about 50 miles northeast of Asheville, the other about 20 miles due south of Asheville in Henderson and Transylvania counties.

The precipitation after the 16th was insignificant.

HOURLY PRECIPITATION.

Automatic records of hourly precipitation are available only for the principal stations of the Weather Bureau. We have tabulated the hourly values for Mobile, Montgomery, and Birmingham, Ala.; Meridian, Miss.; Atlanta, Ga.; Chattanooga, Tenn.; and Asheville, N. C., for July 5–9, both inclusive, and present them in Table 2. These records show, as was to be expected, varying intensities of rainfall for different portions of the storm and for different portions of the same 24 hours;

thus at Mobile, Ala., heavy rain began 10:11 p. m. of the 5th, increased in intensity until midnight, and then diminished, ceasing at 2 p. m. of the 6th: rain began again between 4 and 5 a. m., July 7, and continued at a moderate rate until between noon and 1 p. m., when the intensity suddenly increased to a maximum of 2.67 inches between the hours of 1 and 2 p. m. The details of this excessive rate follow:

TABLE 1.—*Excessive precipitation at Mobile, Ala., July 8, 1916, 12:40 to 1:50 p. m.*

Five minutes ending—	Accumulated amounts.	Actual 5-minute amounts.	Five minutes ending—	Accumulated amounts.	Actual 5-minute amounts.
	Inches.	Inches.		Inches.	Inches.
12:40 p. m.	0.12	0.12	1:20	1.57	0.32
12:45	0.17	0.05	1:25	1.88	0.31
12:50	0.29	0.12	1:30	2.42	0.54
12:55	0.42	0.13	1:35	2.85	0.43
1:00	0.49	0.07	1:40	2.92	0.07
1:05	0.68	0.19	1:45	3.02	0.10
1:10	0.93	0.25	1:50	3.09	0.07
1:15	1.25	0.32			

The period of maximum intensity was from 1:10 to 1:35 p. m., when 2.17 inches of rain fell, or at the rate of 5.21 inches per hour. The above appears to be the greatest fall for 25 minutes in August as far as the records of automatic gages are concerned. An eye observation of a fall of 2.12 inches in 20 minutes at Jupiter, Fla., on August 21, 1893, or at the rate of 6.36 inches per hour, is probably the greatest fall of record for 20 minutes in August.

TABLE 2.—*Hourly rainfalls at seven selected stations in the southeast, July 5 to July 9, 1916, inclusive.*

July 5.

Stations.	A. M.												P. M.												Total 24 hours.
	1	2	3	4	5	6	7	8	9	10	11	Noon.	1	2	3	4	5	6	7	8	9	10	11	Midnight.	
	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.
Mobile						T.	T.	0.02	0.05	0.13	0.18	0.20	0.24	0.46	0.12	0.16	0.30	0.32	0.33	0.34	.51	0.63	0.90		5.82
Montgomery												T.	T.	T.	T.	T.	T.	T.	T.	.04	.09	.02	.05		0.13
Meridian													T.							.03	.12	.02	.16		0.46
Birmingham													T.	.01						T.	T.	.05	.20	T.	0.26
Atlanta													.10	.03	.06						T.	T.			0.19
Chattanooga																									0.00
Asheville																									

July 6.

Mobile	0.75	0.13	0.10	0.15	0.15	0.19	0.05	0.34	0.20	0.54	0.12	0.01	T.	0.01	0.20	0.27	0.03	0.27	0.16	0.29	0.11	0.05	0.18	0.66	2.74
Montgomery	.07	.14	.15	.12	.16	.13	.22	.14	.16	.33	.64	.25	0.17	.76	.19	.21	.77	.13	.09	.05	.22	.21	.33	.66	5.66
Meridian	.09	.11	.24	.51	.19	.60	.36	.33	.21	.08	.09	.25	.36	.53	.29	.22	.13	.03	.21	.15	.35	.14	.16	.10	6.20
Birmingham	.02	.06	.08	.03	.02	.03	.06	.01	.12	.23	.44	.72	.33	.01	.01	T.	.18	.05	.16	.02	.01	.05	.01	.32	4.58
Atlanta						T.		.03	.08	.07	T.	.02	.01			.01	T.	T.	T.	.05	.05	.01		.01	0.75
Chattanooga													T.	.01										.04	0.06
Asheville																									0.00

July 7.

Mobile					0.03	0.06	0.09	0.24	0.30	0.16	0.37	0.16	0.57	2.67	0.09	T.	T.	0.11	0.14	T.					4.90
Montgomery	0.11	0.05	0.05	0.03	.01	.08	.09	.10	.03	.06	.15	.82	.13	.32	.13	0.02	0.06	.07	.02	0.01	T.	T.	0.01	T.	2.35
Meridian	.23	.02	.18	.02	T.		T.	.03	.08	.46		T.	T.			.02	.01	.02	.01	.01	T.	T.	T.	T.	1.00
Birmingham	.41	.08	.44	.41	.34	.53	.23	.14	.74	1.15	.77	.05	.07	.19	.16	.08	T.	.04	.07	.16	0.06	0.23	.29	0.38	7.02
Atlanta	.01	.01	.06	.01	.04	.02	.04	.24	.27	.54	.24	.06	.12	.13	.06	.13	.52	.11	.02	.03	.02	.10	.11	.09	2.96
Chattanooga	.04	.04	.05	.06	.01	.02	.03	.06	.04	.12	.25	.10	.07	.13	.08	.07	.03	.02	.06	.11	.09	.04	.01	.05	1.56
Asheville													T.	.09	T.	T.	.01								0.10

July 8.

Mobile					T.										0.04	0.30									0.34
Montgomery	T.	T.													.03	.06			0.16	T.	0.07	0.03	0.16	0.36	0.73
Meridian	T.	T.											0.13	0.01			0.04	T.							0.22
Birmingham	0.14	0.02	0.01	0.18	.03	T.	0.02	0.02	T.	T.	0.01	T.	0.02	0.02	.02	.01	.01	T.	T.	0.04	.04	T.	.04	.04	0.67
Atlanta	.15	.17	.20	.23	.03	.16	.09	T.		.06	0.08		T.	.02	.04	.01		.02	.13	.01	0.01	.10	.18	.08	1.87
Chattanooga	.25	.20	.21	.26	.31	.43	.26	0.25	.41	.23	.11	.11	.21	.09	.02	.28	.12	.32	.31	.12	.18	.04	.07	.02	4.84
Asheville								.01	.14	.10	.09	.11	.10	.12	.22	.06	.14	.35	.03	.06	.20	.08	.12	.15	2.08

July 9.

Mobile	T.																								T.
Montgomery	0.28	0.07	0 02	T.	0.01	T.	0.03	T.	0.01	T.	T.	T.	T.	T.	T.	T.	T.								0.44
Meridian																									T.
Birmingham	.02	.02	.01	0.03	.01	0.02	.02	0.01	T.	T.	0.01	0.01	0.01	0.01	0.01	T.	T.	0.01	0.01		0.02	0.11	0.07	0.12	0.53
Atlanta	.65	.38	.14	T.	.07	.01	.05	.10	.03	0.04		.04	.01	.02	0.03	0.01	.01	.04	.07	T.					1.69
Chattanooga	.01	.19	.12	.01	.14	.07	.14	.31	.02	.03	.06	.10	.54	.05	.54	.15	T.	.06	.13	0.01	.02	.01	.02	.01	2.74
Asheville	.18	T.	.04	.06	.02	T.	T.	T.	T.	.04	.14	.05	.29	.04	.07	.02	.08	.03	.03	.02	.04	.04	.03	.01	1.91

CUMULATIVE PRECIPITATION.

In figure 20 will be found curves showing for 5 stations the cumulative precipitation during the continuance of the storm. In the last curve of the diagram, reading from left to right, that for Blowing Rock, N. C., the cumulative precipitation for both storms is given. The rains of the 8th in western North Carolina were light. On the 9th and 10th they were uniformly heavy; and again on the 15th and 16th as graphically shown in the diagram. It was only in western North Carolina that the severity of the floods was markedly increased by the sequence of the rains. River stages in the watersheds given on the diagram will be found in Table 4 and hydrographs in figures 18 and 19.

FLOODS IN THE RIVERS OF MISSISSIPPI AND ALABAMA.

The rains in the East Gulf States began along the coast of Alabama and Mississippi on July 5 and advanced to the northern parts of those States by the night of July 6, the heaviest rains falling on the 6th, 7th, 8th, and 9th. While there were some scattered heavy rains on the 10th, those in Alabama and Mississippi were mostly light after the 9th. (See the rainfall maps, figs. 3–11.)

When the rains began the rivers were at low stages and the ground was moderately dry, although there had been intermittent thundershowers during the 10 days previous.

The rains, it may be remembered, began first over the lower reaches of the rivers and progressed toward the headwaters of the streams. The run-off where the rainfall was heavy reached the streams almost immediately, and we have the rather anomalous situation of a river being in flood in its lower reaches before the headwaters have reached the flood stage. Thus the Pascagoula at Merrill, Miss., as a result of the heavy rains on the 6th (over 12 inches) reached the flood stage on the 7th although the crest stage at the next up-river station was not attained until three days later. In the region of heavy rains and consequently high run-off the first effect of the rains was a sudden and very marked rise, followed by a slight fall, and then a second and longer rise. The flood stage was naturally long drawn out by reason of the advance of the rains in a direction directly opposite to that of the course of the streams.

The Black Warrior River at Tuscaloosa crested at 66.3 feet at about 6 p. m. of the 8th and continued above the flood stage until the 16th; it was again in flood on the 20th and the 21st.

The Tombigbee reached flood stage at the uppermost gaging station on the river, Aberdeen, Miss., on the 11th and at Demopolis, Ala., the lowermost station, 4 days later.

The two main tributaries of the Alabama River—the Coosa and the Tallapoosa—crested at different times owing to the rainfall distribution in their respective watersheds. The Tallapoosa, at Millstead, Ala., barely reached the flood stage on the 9th, while the Coosa crested at Wetumpka two days earlier and at Rome, Ga., 3 days later. The failure of the floods on these two rivers to synchronize operated to diminish the flood wave on the Alabama. As a result the latter was a long drawn out swell. (See the hydrograph for Selma, fig. 18.)

The fluctuations of the Coosa River at Wetumpka, Ala., were unusual. On the morning of the 7th the 24-hour rise was 23.8 feet; in the succeeding 24 hours it rose 23.4 feet, bringing the stage up to 51.4 feet at 7 a. m.,

July 8. It then rose slowly to a crest of 51.5 at 3 p. m. of the 8th and then began to fall, reaching a stage of 49 feet on the afternoon of the 9th; it then began to rise again and reached a second crest of 51.3 feet at 3 p. m. of the 11th. These irregular fluctuations may be due in part to the manipulation of the floodgates at the Alabama Power Co.'s plant at lock No. 12 on the Coosa River.

Overflow in Alabama and Mississippi.—An attempt has been made to show the areas of overflowed lands along the rivers of the East Gulf and South Atlantic States. (See fig. 1.) By reason of the small scale of the map these areas must be considered as approximate only.

The Pascagoula River from Merrill, Miss., to the coast overflowed its banks on an average about 3 miles on each side of the river and in places to a greater extent. In the counties of Wayne, Jones, Forrest, Perry, Greene, George, Pearl River, Hancock, Harrison, and Jackson much damage was sustained by high winds as well as by heavy rains and overflow.

The lowlands for 90 miles along the Black Warrior between Tuscaloosa and Demopolis, Ala., and along the Tombigbee for 170 miles below the last-named place were inundated on an average at least 1¼ miles on each side of the river.

Mr. P. H. Smythe, section director of Alabama, estimates that 350,000 acres of land in that State were overflowed, with a total loss of all crops thereon.

The rivers of Georgia at the beginning of the rains were at the usual low stages of midsummer. The slow movement of the tropical cyclone and the continued rains of the 5th and 6th started a moderate flood stage in the upper reaches of the Chattahoochee on the 8th, and this was followed by a second moderate flood wave on the 10th. Along the middle stretches of the stream, as at Columbus, Ga., and Eufala, Ala., the rains culminated on the 8th in tremendous downpours; 12.7 inches fell at Alaga, Ala., 10.8 inches at Eufala, Ala., 9.9 inches at Blakely, Ga., and 9 inches at Fort Gaines, Ga. The river at Eufala responded immediately by a rise of 38.8 feet, viz, from 3.8 feet on the 7th to 42.6 feet on the morning of the 8th. The flood wave coming down the river did not reach Eufala until the next day, when an additional rise of 7.4 feet was recorded. The Flint River was also in flood, but not to the same extent as the Chattahoochee, and this is also true of the other large rivers of Georgia—the Ocmulgee, Oconee, Altamaha, and the Savannah.

Floods in the rivers of South Carolina.—The rains that attended the first storm did not begin over South Carolina until the 8th (see Table 1) and were not specially heavy, except over the mountain headwaters in North Carolina. The effect of these rains, however, was to saturate the soil and cause freshet stages on all the streams. These freshets had begun to decline when the second storm with its attendant rainfall overspread the State. The heavy rains of the second storm began over the watersheds of the Black, Lynches, and Great Pee Dee Rivers in the lowlands of the State and at a time when these rivers were comparatively low. Fortunately, the rains of the first, or Alabama, storm were not heavy over the lowlands of the Carolinas. The rise of the Black, the Lynches, and the Great Pee Dee is shown by the hydrographs on figure 19.

As the second storm moved inland over South Carolina on the 15th, heavy rains fell, beginning on the afternoon of that date and continuing for about 24 hours. It was to these rains that the disastrous floods in the upper tributaries of the Santee were due. On the 16th the Catawba at Mount Holly, N. C., had reached a stage of 3.5 feet above the previous highest record. On the

17th the flood crested at a stage of 45.5 feet (estimated, the gage having been washed away). That stage is 22.5 feet above the previous high-water mark.

The Catawba rises in North Carolina in the counties of Caldwell, Burke, McDowell, and Avery directly east of the Blue Ridge and at an elevation of about 2,500 feet. It flows thence southeasterly as the Catawba in North Carolina and as the Wateree in South Carolina, forming with the Congaree the Santee. The gradient of the upper part of the Catawba is steep, its profile showing a fall of about 2,325 feet in the 200 miles between headwaters and Camden, S. C.[3] At the last-named point the zero of the gage is 175 feet above mean sea level. At the junction of the Wateree and the Congaree the water surface is probably not more than 100 feet above mean sea level. The steep gradient above "the fall line"[4] is a characteristic of all rivers of South Carolina, except the Little Pee Dee, Waccamaw, Lynches, Combahee, Edisto, and Black, which rise wholly within the Coastal Plain and flow directly into the Atlantic. The flood on the Catawba in North Carolina is perhaps the most severe of which there is record. At Mount Holly, N. C., the uppermost gaging station on the river, the crest was 22.5 feet above the previous high-water mark, viz, that of the 1908 flood. The excess of the next down-river station, Catawba, S. C., just inside the South Carolina border, was but 12 feet, and still farther down and about 200 miles from the head-waters an excess of but 3 feet above the 1908 crest was noted. The force of the current greatly abraded the banks of the stream, the width of which at moderate stages is now 50 feet greater than formerly, as determined by a recent inspection of three points, viz, Mount Holly, N. C., and Catawba and Camden, S. C. The lateral corrasion of the channel thus observed must have been due to the great increase both in the velocity of the stream and the load which it carried. It would be interesting to know in this connection to what extent vertical corrasion was effective in deepening the channel at the time the banks were so greatly abraded.

It is a notable fact that in no other part of the United States are the forces of landscape sculpturing so active and effective as in the South Atlantic States, mainly because those regions more than others are subject to heavy precipitation and consequently frequent floods. Nowhere in the United States, so far as known to the writer, are the streams subject to such frequent and marked changes in volume and in the degree to which they are loaded as in those which have their source in the southern Appalachians.

The Broad River at Blairs, S. C., exceeded the previous high-water mark by 5.4 feet. The Santee at Rimini, S. C., exceeded the previous high-water mark by 2.2 feet; at Ferguson by 1 foot. The Black at Kingstree, S. C., exceeded the previous high-water mark by 1 foot.

The three main tributaries of the Santee which rise in the southern Appalachians are the Saluda, the Broad, and the Wateree, naming them in order from west to east. That one farthest west, the Saluda, was not in extraordinary flood since its watershed was a little outside the region of heavy rains.

The rivers of South Carolina in their course to the sea pass through great swamps in the Coastal Plain. In times of flood vast quantities of water are impounded in these swamps. This explains in a way the flattening out of the flood crest as it passes to the lower reaches of the streams. It will be noted that at Ferguson, the lowermost station on the Santee, the excess of the 1916 flood over previous floods was only 1 foot, notwithstanding the great volume of the flood flow in the upper tributaries.

There was a freshet in the Great Peedee, the farthest east of the larger rivers of South Carolina, on July 6 and again on the 12th. The stage at Cheraw, S. C., on the 15th was about 9 feet below flood. From this point it rose to 6 feet above flood on the morning of the 16th and crested at 36.1, or 9.1 feet above flood stage, on the 19th.

Rivers of North Carolina.—The floods in the rivers of North Carolina which drain into the Atlantic were not severe except in the upper reaches of the Great Peedee (Yadkin).

West of the Blue Ridge all the streams flowing into the Tennessee were in severe flood, probably the most disastrous so far as loss of life and property is concerned being in the French Broad. Gagings in that river are made at Asheville, N. C. On the morning of the 9th the river had reached a stage of 4.8 feet (flood stage, 4 feet), and by the morning of the 11th it had risen to a stage of 8.8 feet; it then declined until the morning of the 15th, when it stood at exactly 4 feet, or flood stage. The tremendous rains on the 15th–16th in the watershed of the river caused it to rise with great rapidity. At 8 a. m. on the 16th it stood at 13.5 feet, 9.5 feet above flood; by 9 a. m of the same day it had risen to 18.6 feet; and at 10 a. m. the bridge on which the gage was located was washed away. The crest of the flood was about 21 feet; the exact figures will be determined later. The width of the French Broad at Asheville at bankful stage (4.4 feet) is 381 feet. At the time of the flood the width of the stream was said to have been a quarter of a mile. All industrial plants along the river were badly flooded, in some cases the water reaching the second stories of the buildings. The flood waters from the upper tributaries of the Tennessee made but a brief flood in the trunk stream at Knoxville about 149 miles below Asheville, where a crest stage of 30.2 feet, 18 feet above flood, was reached at noon of the 18th. At Chattanooga, about 180 miles below Knoxville, the crest was reached two days later, viz, on the 20th, with a gage reading of 30.2 feet, 2.8 feet below flood. Flood stages on the Tennessee below Chattanooga had been reached earlier in the month, but the flow from the upper tributaries due to the torrential rains of the 15th–16th did not cause a flood stage in the main river below Knoxville, and at the latter place for a little less than three days only.

Flood in New River.—The area of heavy rains in North Carolina embraced portions of the watershed of the New or Great Kanawha River. This region (see Table 3, North Carolina) received heavy rains beginning on July 9 and culminating on July 16. On the last-named date New River crested at Radford, Va., at 32 feet (estimated, gage being washed away), 18 feet above flood stage. When this flood reached the lower part of the Great Kanawha it had diminished to about a freshet stage, there being no supporting flood flows in the lower part of the basin.

Daily river stages during the continuance of the flood are given in Table 4.

PREVIOUS FLOODS.

A writer in the Columbia State for Aug. —, 1916, Mr. W. P. Houseal, is authority for the statement that in 1796 a storm passed inland and, crossing the Blue Ridge, created great

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[3] A survey of the Catawba River from the Halltown Road crossing, near Marion, N. C., to the mouth of Johnsons Mill Creek, a distance of 45 miles, gives a total fall in that distance of 243 feet (U. S. Geol. Survey, Water Supply Paper No. 115).

[4] A line closely agreeing with the geologic boundary between two geologic formations and characterized by falls and steep rapids in those streams that cross it. In a general way it may be said to bound two topographic provinces of the State, viz, the Coastal Plain and the Piedmont Plateau. (See Maryland Weather Service, Baltimore, 1899, v. 1, pp. 102, 116, and pl. III.)

havoc in the Broad and Saluda Valleys; also that 56 years later—viz, in 1852—a second storm following the same path caused great destruction, especially to the Columbia & Greenville Railway, which had then been in operation only a few years. The same writer refers to three freshets intervening between 1852 and 1908—viz, the so-called Sherman's flood of 1865, a freshet in May, 1886, and in September, 1888. The Weather Bureau records confirm the account of freshets of May, 1886, and September, 1888, and also contain mention of a freshet in 1840, said to have been 15 inches lower than the flood of September 11, 1888. Inasmuch as the crest of the latter at Augusta, Ga., was 38.7 feet, the 1840 flood must have reached a stage of 37.5 feet.[5] The order of magnitude of the floods in the Savannah at Augusta is probably as follows:

	Feet.
First, August, 1908	38. 8
Second, September, 1888	38. 7
Third, ——. 1840	37. 5
Fourth, March, 1912	36. 8

The crest of the 1916 flood at Augusta was but 28.4 feet on the 12th, 3.6 feet below flood stage. The headwaters of the Savannah were outside the region of heavy rains on the 15th and 16th, and consequently the river did not reach the flood stage. This fact illustrates the error inherent in an attempt to pass from great rainstorms to great floods, and vice versa, using the record of a single river only.

Previous floods in the Catawba, of which there is a printed record,[6] occurred in May and June, 1901. A maximum discharge of 150,825 cubic feet per second, or more than 50 cubic feet per second per square mile of drainage area, was recorded in this flood near Rock Hill, S. C.[7]

LOSS OF LIFE AND PROPERTY.

The precise number of persons who lost their lives in the floods will doubtless never be known, although the best information at hand places the loss of life at about 80, the great majority of whom were drowned in the streams of western North Carolina. Eighteen persons went down with the Southern Railway bridge at Belmont, N. C., on July 16, and the majority of these were lost. There was also some loss of life along the Gulf coast during the prevalence of hurricane winds, but these have not been included in the above number. The property loss, as closely as can be figured, was near $22,000,000, distributed as follows:

Tangible property, buildings, roads, bridges, culverts, etc.	$4, 917, 574
Crops not gathered	11, 606, 128
Live stock and movable farm property	811. 513
Suspension of business, loss of wages, etc	1, 938, 870
Railroads, in roadbed, bridges, trestles, culverts, etc	[8] 2, 450, 000
Total	21, 724, 085

Thus it is seen that by far the greater loss falls upon the agriculture of the region. The figures are probably incomplete and at best should be considered as rough approximations to the truth.

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[5] The crest of this flood is given as 37.3 feet in Report U. S. Chief of Engineers, 1888, pt. 2, p. 1026.
[6] Engineering News, New York, Aug. 7, 1902.
[7] U. S. Geological Survey, Water Supply Paper No. 83. Washington, 1903.
[8] Incomplete reports.

The loss of crops was due in some cases to hurricane winds which swept over southeastern Mississippi and southern Alabama, attended by heavy rains; in the greater number of cases, however, the loss of crops was due to flooding, especially along the Cahaba and Alabama Rivers in the counties of Perry, Dallas, Wilcox, and Monroe, Ala. In these counties approximately 250,000 acres of farm lands were inundated for several days, with a total loss of all crops thereon. The loss in these counties alone, figuring it at $10 per acre, a not unreasonable figure, approached two and one-half million dollars.

It is reported that in the counties of Greene, Perry, Forrest, George, Jackson, and Harrison, Miss., the loss to standing timber that was leveled by hurricane winds will approach $3,000,000. These figures have not been included in the aggregate above given, since a portion of the timber may be recovered.

In a few cases heavy loss by erosion has been reported, but it is believed that the gain from a deposit of silt, which must have been very general in the lower reaches of streams in the East Gulf States, will offset the losses by erosion.

That agricultural interests have suffered greatly cannot be doubted for a moment, although to what extent in some regions is problematical. The regions most affected by heavy rains and strong winds were southeastern Mississippi, a large part of central and southern Alabama, and parts of South Carolina directly northeast of Charleston, extending thence through the line of counties on the west bank of the Great Pee Dee to the North Carolina border.

The damage in western North Carolina was largely confined to railroads, both steam and electric, industrial plants, public-service organizations, including water, power installation and other industrial enterprises.

Too much credit can not be given the railroads in their effort to reestablish and maintain transportation routes in the face of grave difficulties. In a number of cases the only possible solution of the problem was a resort to the methods of primitive people, viz, the ferry operated by man power. Within a week, or 10 days at the utmost, travel was restored in a limited way, of course, between all important points.

An interesting phase of the subject is the probability of the occurrence of a similar disaster in the future. Unfortunately, our present knowledge of the underlying causes of cyclonic storms, their distribution in time and space, is so indefinite that any discussion thereon must be largely speculative. It may be said, however, that the floods in Mississippi, Alabama, and Georgia were due almost wholly to a single long-continued rainstorm which was closely associated with the passage inland of a tropical cyclone. Likewise, the floods of the rivers in the coastal plain of South Carolina, especially the Great Pee Dee, were due to the movement inland of a single tropical cyclone. The floods in the streams originating in North Carolina were due to the torrential rains of the 15th and 16th coming at the close of a period of heavy rains that were associated with the first or Alabama storm. Tropical cyclones do not, as a rule, synchronize as did these two, and on that fact we would base our belief that a repetition of the storms of July, 1916, is not probable more than once in a century at least.

TABLE No. 3.—*Daily precipitation, in inches and hundredths, July 5–18, 1916, inclusive.*

State and station.	Watershed.	July, 1916.															
		5	6	7	8	9	10	11	12	13	Total, 5–13.	14	15	16	17	18	Total, 14–18.
		In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.
Mississippi—																	
Louisville	Pearl		2.25	3.0"	0.47	0.15	0.13	0.90	1.05	0.00	8.34	0.14	0.00	0.20	0.14	1.00	1.48
Edinburg [1]	do		0.74	4.64	0.55	0.17	0.10	0.10	0.20	0.15	7.04	0	1.62	0.10	0.03	T.	1.75
Kosciusko [1]	do		0.52	2.25	1.03	0.30	0.01	0.30	0.33	0.02	4.79	0	0.03	0	0.12	0.01	0.16
Lake [1]	do		1.15	2.50	0.20	0.05	0	0	0.25	0	4.55	0	0.30	0	0.02	0	0.32
Jackson	do		1.58	0.25	6.11	T.	0	9.24	0.00	0	2.27	0	0	0.41	0.90	0.01	1.41
Crystal Springs [1]	do		1.65	2.09	0.55	0.05	0	0	0	0	1.65	0	0	0.25	0	0	0.25
Hazlehurst [1]	do		1.20	2.00	0.35	0.16	0	0	0.96	0	1.67	0	0	0	3.10	0.02	2.12
Brookhaven [1]	do		0.91	2.08	0.03	0.02	P.	T.	0.12	0	3.10	0	1.13	0.09	1.70		2.92
Monticello	do		2.25	0.40	0.13	0	0.03	0.08	0	0	2.88	0	0	0	0.77	0	0.77
Magnolia	do		1.25	T.		0	0	0	0	0	1.25	0	0.18	0	T.	0.22	0.40
Columbia [1]	do		1.85	1.33	T.	0	0	0	T.	0	3.18	0	0	0.77	0	0.50	1.27
McNeil	do		2.00	9.85	0.92	0.01	0.62	0.65	0	0	13.18	0	0.30	0	0	1.28	1.58
Fearlington	do		1.10	0.61	0.24	0	0	1.86	0	0	1.07	0	0.18	0	0.90	0.62	1.70
Meridian [2]	Chickasawhay		6.20	1.04	0.28	T.	0.02	0.93	0.08	T.	8.60	T.	0	T.	0.98	0.77	1.75
Hickory	do		1.52	3.06	0.10	0	0.11	0.21	0.43	0	8.73	0	0.18	0	0.07	0.68	0.33
Enterprise [1]	do		3.62	4.65	0.18	0.10	0.08	0	0	0	8.03	0.10	0.56	0	0	0.38	0.84
Shubuta [1]	do		4.95	3.85	0.20	0.15	T.	0	0.15	0	9.40	0	0.25	0	T.	T.	0.25
Waynesboro [1]	do		5.90	6.20	1.00	0.12	T.	0	0.85	0.18	13.95	0.18	0.60	0	0	T.	0.78
Leakesville [1]	do		10.00	6.51	2.46	0	0	1.39	1.25	0	21.55	0	0.40	0.08	0	0.50	0.98
Collins	Leaf		3.35	4.75	0	0	0	0	0	0	8.10	0	0.01	0	0.03	0.02	0.06
Laurel	do		9.09	0.28	0.05	0	0.10	1.57	0	T.	11.09	0	T.	T.	0.23	T.	0.23
Hattiesburg [1]	do		4.10	3.75	0.24	0.14	0	0	0	0	8.28	0	0	0.38	0	0.15	0.53
Merrill [1]	Pascagoula		12.35	3.60	4.09	0	0	0	(*)	(*)	19.35	0	(*)	1.25	0	0	1.25
Aberdeen [1]	Tombigbee	T.	0.08	6.62	1.76	0.05	0.56	1.85	1.00	T.	11.92	0.10	0.18	0.03	0.15	0.24	1.00
Agricultural College	do	0.16	2.00	2.00	0.61	0.27	0.22	2.32	0.12	0.12	8.15	T.	0	0	T.	T.	T.
Booneville	do	0.14	0.58	5.14	0.52	0.05	0.55	0.47	0	0	7.47	0.46	0	T.	0.38	0.82	1.06
Columbus [1]	do	0	1.44	5.35	1.15	0.23	0.45	2.20	0.84	0	10.65	T.	0.15	0.75	T.	0	0.90
Fulton	do	0	1.44	6.15	1.78	0.1	0.51	2.01	0	0.20	12.32	0	0.56	0.33	T.	0.22	1.27
Macon [1]	do	0	0.00	4.29	0.72	0.23	0.70	1.02	0.07	0.16	7.70	T.	0	0	0	0.37	0.37
Okolona [1]	do	0	0.00	4.80	3.40	0.05	0.15	9.40	0.35	0	9.15	0	1.25	0.22	0	1.15	2.62
Porterville	do	0	0.00	3.09	2.50	1.50	0.30	0.30	0.40	0	8.00	0.25	0	0.10	0	0	0.45
Tupelo	do	0.13	1.65	4.67	1.15	0.03	0.45	0.65	0.05	0.07	8.91	2.14	0.05	0	0.50		2.69
Alabama—																	
Cochrane [1]	do	0.10	1.85	5.24	1.50	0.46	1.35	1.40	0.55	0.50	12.78	1.00	0.00	0.00	0.00	0.00	1.00
Hamilton [1]	do	0	0.10	3.21	3.22	0.31	0.52	0.86	0.65	0.03	8.52	0.17	0.55	0	0.04	0.10	0.86
Demopolis [1]	do	0	2.52	4.42	0.31	0.55	0.50	0.92	0	1.97	11.09	0.25	0	0.49	0.04		0.79
Healing Springs [1]	do	0	0	6.10	9.87	1.45	0	1.24	0.30	0.42	19.38	0	0	0	0	T.	T.
Livingston [1]	do	0	2.43	4.12	0.58	0.44	0.41	0.97	0	0.57	9.82	0.17	0	0	0	0	0.17
Pushmataha	do	0.50	7.00	1.92	0.32	0	0	0	1.28	0.11	10.63	0.26	0	0	0.03	9.88	1.17
Thomasville [1]	do	T.	4.70	5.20	3.36	0.30	0.28	0	0.60	0.20	14.64	0.48	T.	0.31	0	T.	0.82
Bermuda	Escambia		8.00	2.30	2.65	0.22	T.	0.10	T.	0.56	13.83	T.	0.36	T.	T.	T.	0.36
Evergreen [1]	do		11.95	3.32	3.25	0.35	0	0	0	0.22	19.19	0.15	0	0	0	0	0.15
Flomaton	do																
Fort Deposit [1]	do	0.08	2.20	4.30	1.48	0.20	0.15	0.95	0.10	0	9.38	0.08	0	0	0.10	0.06	0.24
Greenville [1]	do	0	2.70	2.85	1.63	0.67	T.	0.42	0	0.62	8.89	1.01	0	0	0	0	1.01
Highland Home	do	0.16	4.20	1.82	0.29	0.07	0.74	0.25	0.15	0.49	8.01	0	0	0.49	0	T.	T.
Troy	do	0.20	2.26	3.80	1.77	0.43	0.70	0.29	0.10	0.79	10.14	0	0.38	0.65	0	0.52	1.55
Bridgeport [1]	Tennessee	0	0	1.05	1.95	0.87	0.62	1.22	0	0.16	5.87	0	0	0.12	0.04	0	0.16
Decatur [1]	do	0	0.04	2.10	4.20	0.98	0.32	0.10	0.69	0.18	8.61	0.20	0	0	0	1.82	2.02
Florence [1]	do	0	0	2.42	5.64	0.84	0.30	0.84	0.44	0.04	10.52	1.44	0	0.06	0.28	0	1.78
Guntersville [1]	do	0	0.40	2.95	2.69	1.71	0.95	0.72	0	0.25	9.58	1.35	0	0	0.10	0	1.45
Madison	do																
Riverton [1]	do	0	0	2.10	4.23	0.05	0.28	0.19	0.75	T.	7.60	0.97	0.61	0	0	0.56	2.17
Scottsboro	do	0.14	0.41	1.60	2.45	0	1.45	0.47	T.	0.50	6.97	0	0	0.04	0.32	0.27	0.63
Tuscumbia [1]	do	0	0	2.20	0.40	0.42	0.50	0.21	1.12	0	9.49	0.65	0	0	0.70	0	1.35
Auburn	Tallapoosa	T.	1.38	3.23	3.61	1.10	0.55	0.18	0.28	T.	10.83	T.	0	0.42	T.	T.	0.42
Camp Hill	do	0	2.15	2.70	1.10	1.63	0.60	0.11	0.35	0.95	9.79	0	1.20	0	0	0.10	1.30
Dadeville	do	0	0.60	3.60	3.30	1.50	2.22	0.35	0	0.10	11.67	0.35	0	0.20	0	0	0.55
Milstead [1]	do	0	0.55	4.05	1.95	1.05	0.24	0.48	0.20	T.	8.52	0.04	1.00	2.30	0	T.	3.34
Opelika [1]	do	0	0.31	1.27	2.65	3.64	1.00	0.20	0.21	0.49	8.77	0	0.07	T.	0	0	0.07
Tallassee [1]	do	0	0.35	3.93	2.35	0.85	0.55	1.16	0.66	0.03	9.88	0.06	0.01	5.12	0.10	0.02	5.31
Tuskegee	do	0	0.60	3.60	2.02	1.00	0.26	0.33	T.	0.21	9.40	T.	0	0.66	T.	T.	0.66
Union Springs [1]	do	0.08	0.60	1.91	2.16	0.20	0.06	0.60	0.90	0.13	5.60	0.25	0	0.11	0	0.15	0.51
Benton	Alabama	0.00	3.20	2.64	2.98	0.00	0.00	0.82	0.31	0.64	10.59	0.42	0.00	0.60	0.69	0.00	1.11
Citronelle [1]	do	2.38	3.99	3.47	0	0	0.17	1.05	0.02	0.24	8.94	0.78	0	0	T.	1.06	1.84
Montgomery [2]	do	0.13	5.66	2.35	0.78	0.49	1.14	0.52	0.08	0.03	11.05	0	1.50	0	T.	0.05	1.55
Prattville	do	T.	5.37	3.36	0.17	0.29	0.80	0.60	0.19	0.62	11.40	0	0	0.20	0.08	0.12	0.40
Selma [1]	do	0	2.44	2.90	4.87	0.33	0.20	0.98	0	0.35	12.07	0.88	0	0.03	0.08	0.02	1.01
Birmingham [2]	Black Warrior	0.26	4.58	7.02	0.67	0.53	1.47	0.01	T.	0.08	14.36	0.81	0	0.87	1.74	0.13	3.55
Cordova	do	T.	3.38	6.25	2.00	1.55	1.22	0.10	0	1.23	15.73	0	0	0	0.31	2.13	2.44
Greensboro [1]	do	0	1.03	6.21	1.53	0.67	0.68	0.91	0	0.58	11.61	0.09	0	0	0	0.78	0.87
Oneonta	do	0.18	1.90	4.53	2.67	0.75	0.98	0.08	0.05	0.35	11.31	0.32	0.05	0.03	0	1.97	2.37
St. Bernard	do	0.26	0.58	5.51	2.78	0.36	0.63	0.69	0	0.26	10.81	T.	T.	0.03	0	0.01	1.31
Tuscaloosa [1]	do	0.55	0.35	8.37	1.90	0.73	0.68	1.12	0	0.56	13.71	1.19	0	0	1.27	0.73	2.22
Alaga [1]	Chattahoochee	0.05	1.07	0.51	12.70	5.62	0.82	1.92	0.13	0	22.79	0	T.	0.11	0.44	0.45	1.03
Eufaula [1]	do	0	0.30	2.34	10.86	1.74	0.12	0.25	0.02	0.03	15.66	T.	0	0.68	T.	0	0.68
Bay Minette	Coast	*	12.20	5.10	0	0	1.70	0.23	0	1.21	20.44	1.44	0	0	0	0	1.44
Mo' lle [2]	do	5.82	2.74	4.90	0.34	T.	0.09	1.91	0.03	0.22	10.32	2.10	0.06	0	0	0	2.16
Ozark [1]	do	0	1.68	0.10	9.00	1.20	0.20	0.20	0.20	0.24	12.82	0	0	0	0.40	0	0.40
Ro' ertsdale	do	12.50	5.58	1.23	3.32	0.04	0	0.53	0.03	T.	10.73	0.26	1.23	0	0.11	0	1.60
Anniston [2]	Coosa	0.50	4.23	2.99	1.39	1.89	0.86	0.35	0.79	0.79	13.20	0.39	0	0.50	T.	0.13	1.02
Ashville	do	0	2.50	2.00	2.50	3.10	0.60	T.	0.10	T.	10.80	0.80	0	0.60	T.	T.	1.40
Calera [1]	do	0	0.91	7.00	3.50	0.50	0.75	0.37	0	T.	13.06	0.70	0.72	0	0.42	0.03	1.87
Clanton [1]	do	0	0.93	11.23	3.65	0.76	0.44	1.40	0.36	1.43	22.30	0.12	0	0.07	0.12	0	0.61
Gadsden [1]	do	0.08	0.20	4.88	2.90	1.88	0.90	0.48	0	0.38	11.62	0.64	0	0	0	1.20	1.84
Goodwater [1]	do	0	0.80	8.05	3.17	1.30	0.50	0.55	0.10	0.17	14.54	0.47	0	0	0.15	0.15	0.77
Lock No. 4	do	0.30	3.00	3.00	1.75	1.03	1.00	0.28	0.60	1.00	11.66	0	0	0	0.10	0.90	1.00
Maple Grove [1]	do	0.16	3.45	3.25	2.09	0.99	0.57	0.01	0.05	0.40	10.81	0.10	T.	0	0	0.02	0.12
Mentone [1]	do	T.	0	1.92	5.12	1.55	1.80	0.66	T.	0.12	11.17	0.28	0	0.25	T.	0.20	0.73
Talladega	do	T.	4.90	3.75	1.43	0.60	0.55	0.85	0.10	0.20	13.80	1.00	0	0	0	0.05	1.05
Valley Head	do	T.	0.35	2.50	4.00	1.10	0.90	0.35	0	0.10	9.30	0	0.65	T.	0.55	0	1.20
Wetumpka [1]	do	0	0.42	3.95	1.15	0.95	0.65	1.16	0.14	0	8.42	0.20	0	0.10	0	0	0.30

[1] Precipitation measured at 7 a. m.
[2] Precipitation measured midnight to midnight.
Stations without reference mark measure precipitation about sunset.

* Amount included in next following measurement.

TABLE No. 3.—*Daily precipitation, in inches and hundredths, July 5-18, 1916, inclusive*—Continued.

State and station.	Watershed.	5	6	7	8	9	10	11	12	13	Total, 5-13.	14	15	16	17	18	Total, 14-18.
		In.	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*
Florida—																	
(Western Division.)																	
Apalachicola	Gulf of Mexico	7.10	0.08	0.00	1.60	0.22	0.00	0.00	0.00	0.31	9.31	0.00	0.96	0.14	0.00	0.02	1.12
Bonifay	do	4.40	*	16.10	3.50	0.05	0.40	T.	0.78	0.77	26.00	0.38	T.	0.19	T.	T.	0.57
De Funiak Springs [1]	do	0.20	1.53	0.09	10.84	3.98	0.10	0.15	0.03	0.02	16.94	0.26	0	0	0.54	0	0.80
Garniers (near)	do	2.00	6.01	0.04	3.67	2.37	0	0	0.23	0.23	14.55	0	0	0	0	0	0
Marianna [1]	do	0.70	2.00	0.41	2.90	2.38	0.35	0.75	0.18	0	9.67	0	0.12	0	0.22	0.11	0.45
Molina	do	*	6.50	2.50	0	0	0	0.33	0	0	9.33	0	1.80	0	0	0	1.80
Panama City	do	1.03	0	0.22	0.71	0	1.01	0	0	0.05	3.02	0	0.11	0	0	0.09	0.20
Pensacola [2]	do	2.55	0.14	0.38	3.91	T.	0	0.49	0.10	T.	6.57	0.28	0.63	0.53	0	0	1.44
Wausau [1]	do	3.60	0.52	0.73	2.00	1.00	0	0.05	0	0.09	7.99	0	0	0.09	0.05	0.30	0.44
(Northern Division.)																	
Archer [1]	do	1.16	0	0	0	0	0.23	0	0.04	0	1.43	0	0	0.57	0	0	0.57
Bristol	do	2.30	1.25	1.22	2.57	0.12	0.41	0.32	0	0	8.19	0	1.00	0.03	0.65	0.23	1.91
Carrabelle	do	1.08	0.96	T.	0.77	0	0.42	0.10	0	0.68	4.01	0	0	0.22	0	0	0.23
Cedar Keys	do	0	0	0	0	0.32	0	0	0	0	0.32	0	0	0	0	0	0
Crescent City	Atlantic	0.01	0.07	0.62	0.13	0	0	0.14	0	0	0.97	0	0.11	0	0	0	0.11
Federal Point	do	0.05	0.08	0.71	0.10	0.10	0.13	0	0	0	1.17	0	0.01	0	0	0	0.01
Fenholloway	Gulf of Mexico	0.05	0.07	0.16	0	4.85	0	0	T.	0.35	5.48	0.18	0	0	0	0.19	0.37
Gainesville [1]	Atlantic	0.18	0.14	0.23	0.85	0.02	0.22	0	0.02	0.32	1.98	0	0.03	0.29	0	0	0.32
Hilliard	do	0.11	0.73	0.40	0.16	1.06	0.02	0.40	0	0.05	2.93	0	0.83	0	0	0	0.83
Jacksonville [2]	do	0.17	0.43	0.25	0	0.47	0	1.22	0	T.	2.54	T.	0.40	0	0	0	0.40
Johnstown	Suwanee	0.17	T.	1.07	T.	0.25	T.	0	T.	0	1.49	0	0.23	0.02	0	T.	0.25
Lake City [1]	do	0.10	T.	0.05	0.02	1.13	0.64	0.35	0.12	T.	2.42	0	0	0.26	0	0	0.26
Live Oak	do	0	0	1.80	0	2.03	0	0.32	0	0	4.15						
Macclenny	do	0.10	2.00	0.40	T.	0.42	0.12	T.	0	0	3.01	0.18	T.	0	0	0.65	0.83
Madison [1]	do	1.17	0	T.	0.24	1.31	2.90	0.07	0	0	6.02	0.01	0	0	0	0	0.01
Melrose	Atlantic	T.	0.07	1.04	0	0.05	0	0.04	T.	0	1.20	0	0.35	0	0	0	0.35
Middleburg	do	0.10	0.25	0.30	0.10	0	0.18	0	0	0	0.93	0.75	0.08	0	0	0	0.83
Monticello	Gulf of Mexico	0.38	0	1.51	4.50	1.64	0	0.15	0	0	8.38	0	0	0.42	0.06	0	0.48
Mount Pleasant	do	2.32	0.80	0.55	2.75	0.66	0	0	0	0	7.08	0	0	T.	0.21	0.05	0.26
St. Augustine	Atlantic	0	0.19	0	0	0.30	0	0	0	0	0.49	0	0	0	0	0	0
Satsuma Heights	do	0	1.04	0.60	0	0.01	T.	0.17	0	0	1.82	0	0.30	0	0	0	0.30
Switzerland	do	0.20	0.76	0.16	0	0	0	0.19	0	0	1.31	0	0.88	0	0	0	0.88
Tallahassee [1]	Gulf of Mexico	0.30	1.20	1.56	0.95	2.08	0	T.	0.04	0	6.13	0	0.02	1.10	0.55	0.12	1.79
Georgia:																	
Canton [1]	Coosa	0.00	0.80	5.45	1.66	3.25	0.65	0.10	0.00		11.91	T.	0.21	0.00	0.25	1.08	1.52
Ramhurst	do	T.	0.92	1.27	1.71	1.15	0.28	0.20	0.20		5.73	0	1.35	0.40	0.23	0.13	2.11
Resaca [1]	do	0	0.85	2.90	2.80	5.05	0.81	0.75	0.10		12.06	0.02	0	0	0	0	0.02
Rome [1]	do	0.10	1.70	3.00	3.94	0.90	0.75	0.33	0.55		11.27	0	0	0	0.53	T.	0.53
Atlanta [2]	Chattahoochee	0.75	2.98	1.87	1.09	0.83	0.14	T.	0		8.26	0.02	0.06	0.01	0.11	0.05	0.25
Blakely	do	0.60	7.35	9.90	2.44	2.00	0.12	0	0		22.41	0.10	T.	0.11	0.94	0.52	1.67
Columbus [1]	do	0.30	1.58	5.01	2.60	0.55	0.28	1.98	T.		12.33	0	0	0.08	0	0.03	0.11
Dahlonega	do	0.11	0.87	2.69	3.51	1.43	0.53	0.34	0.50		9.93	0.08	0.54	1.08	1.34	0.58	3.62
Fort Gaines [1]	do	0.75	1.80	9.00	1.69	0.50	0.40	0.65	0.25		15.04	0	0	0	0.42	0	0.42
Gainesville [1]	do	0.50	0.55	2.10	2.45	1.15	0.55	0.40	0.45		8.15	0.80	0.62	0.12	0.75	1.54	3.83
Goat Rock [1]	do	0.33	1.43	5.36	0.95	0.60	0.04	0.70	0.01		9.42	0	0	0.13	0	0	0.13
Lost Mountain	do	0.77	2.65	3.21	0.56	0.35	0.20	0	0		7.74	0	0.12	0.12	0	0.08	0.32
Lumpkin	do	0.24	4.00	6.47	1.45	0.47	0.44	0	0		13.07	0	0.03	0	0.03	0.71	0.77
Newnan [1]	do	0.60	2.00	3.50	1.45	0.80	1.12	0.12	0.37		9.96	0	0	0.08	0.12	0.13	0.33
Nor-ross [1]	do	0.08	0.90	4.25	2.46	1.44	0.34	0.22	0		9.69	0.12	0.14	0.80	1.06	1.14	3.26
Talbotton	do	0.57	3.00	5.94	3.07	0.33	0.60	0	0		13.51	0	1.28	0.03	0.15	0.20	1.66
West Point [1]	do	0.65	2.40	3.14	3.19	1.05	0.20	0.47	0		11.10	0.01	T.	0.01	0.60	0	0.62
Albany [1]	Flint	0.24	0.52	4.55	5.10	1.10	0.63	0.10	0		12.24	0.02	0	0	0.82	2.15	2.99
Americus [1]	do	0.06	0.60	4.20	1.00	0.45	0.63	0.26	0		7.19	0.32	0	0	0	1.65	1.97
Bainbridge [1]	do	3.02	0.45	3.50	3.40	0.50	0.02	0.22	0		11.11	0	0	0.15	0	0.57	0.72
Butler [1]	do	0.50	1.25	4.00	1.53	0.70	0.45	0	0		8.43	0.19	0	0.60	0	0	0.79
Concord	do	1.08	2.60	1.55	2.45	0.19	0.72	0.03	0		8.62	0.01	0.12	0.04	0.91	0	1.08
Fair View	do	0.60	3.18	1.64	2.05	0.30	0.17	0.21	1.16		9.31	0.13	0.30	0.01	0.07	0.76	1.27
Marshallville [1]	do	0.10	1.66	3.57	0.90	0.27	0.77	T.	T.		7.27	0.27	T.	0	0	1.61	1.88
Montezuma [1]	do	0.10	0.31	4.09	0.81	0.36	1.28	0	0		6.65	T.	0	0	0	0	T.
Putnam	do	0.75	*	6.25	1.25	0.75	0	0	0		9.00	0	0.80	0	0	0.95	1.75
Woodbury [1]	do	0.45	2.52	4.18	1.65	0.84		0.22	0.10		9.96	0.32	0	0	0.07	0.99	1.38
Abbeville [1]	Ocmulgee	0.51	1.42	3.90	1.25	2.73	0.30	0.16	0		10.87	0.34	0	0	0	0	0.34
Covington [1]	do	0.65	1.10	3.90	1.30	1.00	0.15	0	0		8.10	0	0.35	1.10	2.20	0.20	3.85
Eastman [1]	do	0.06	0.68	2.15	2.28	1.98	0.45	0.15	0		7.75	0	0	0.13	0	0.36	0.49
Griffin [1]	do	0.78	1.75	5.75	5.22	0.76	0.02	0.38	0		14.66	0.25	0	1.33	0.18	0.18	1.94
Hawkinsville [1]	do	0.15	0.95	2.75	2.20	0.65	0.10	0.18	0		6.98	0.05	0	0.07	0	0.63	0.75
Lumber City [1]	do	0.10	0.15	1.25	0.90	3.75	1.40	0.25	0		7.80	0	0.70	0.13	0	0	0.83
Macon [2]	do	1.93	1.50	0.48	0.79	1.02	0.33	0	0		6.05	0	0	0	T.	3.35	3.35
Monticello [1]	do	0.19	1.14	3.13	0.63	1.17	0.22	0.38	0.34		7.20	T.	0	0.03	0.25	0.09	0.37
Louisville	Ogeechee	0.60	0.47	0.95	1.10	0.11	0	0.02	0.03		3.28	0.27	0	0	1.38	0.04	1.69
Millen [1]	do	0	0.70	0.20	0.85	0.65	0.70	0	0		3.10	0	0.35	0.05	0	0	0.40
Statesboro	do	T.	0.28	0.47	1.00	0.50	0.29	T.	T.		2.54	1.00	0.44	0	0	0	1.44
Glennville [1]	Altamaha	0.13	0.67	0.29	0.51	0.55	0.15	1.24	T.		3.49	0.03	0.24	T.	0	0	0.27
Augusta [2]	Savannah	1.08	0.03	0.36	0.48	0.31	0.00	T.	0.21		2.47	0.09	0.49	0.00	0.42	0.00	1.00
Carlton [1]	do	0	1.10	0.78	1.00	1.34	0.14	0.10	0		4.46	0.26	0.07	1.65	0.32	0.16	2.46
Clayton [1]	do	T.	1.00	3.90	5.25	2.72	1.19	0	T.		14.06	T.	0.18	2.00	0	0.23	2.41
Gillsville [1]	do	0.12	0.45	2.00	2.00	1.65	1.10	0	0.05		7.37	0	T.	2.50	0.20	0	2.70
Hartwell	do	0	0.20	1.58	0.81	0.09	0	0.37	0		3.65	0.09	1.44	0.35	1.44	0.02	3.34
Lishon	do	0	0.53	1.03	0.93	0.47	0.03	0	0		2.99	0.24	1.25	0.07	0.02	0.49	2.07
Point Peter	do	0	1.00	1.75	0	1.75	0	0	0.12		4.62	0.14	1.00	0.57	0	0.42	2.13
Savannah [2]	do	1.90	T.	0.20	0.26	T.	0	T.	0.08		2.44	0.11	0.01	0	0	0	0.12
Toccoa [1]	do	0	0.03	1.19	2.96	1.44	0.90	0.61	0		6.43	0	0	1.13	2.05	0.55	3.73
Washington [1]	do	0.05	0.10	0.65	0.90	1.20	1.01	0.60	0.02		4.83	T.	0.05	0.67	0.12	1.35	2.19
Waynesboro [1]	do	0	0.20	0.21	0.51	0.79	0.21	0	T.		1.92	0.17	0.10	0.03	0	0	0.30
Warrenton [1]	do	0.20	0.13	0.55	0.40	1.15	0.64	0.05	0.33		3.45	0	0.68	0.45	0.24	0.62	1.99
Athens [1]	Oconee	0.05	1.28	1.11	0.49	0.76	0.02	0.21	0		3.92	0.44	0.02	0.76	0.10	0.10	1.42
Dublin [1]	do	0	2.26	1.80	0.88	1.71	0.25	0	0.03		7.02	0	0.06	0.31	0.19	0	0.56
Eatonton	do	1.48	1.43	0.92	0.75	0.85	0.26	0.64	0		6.34	0	0.15	0.75	0.24	0.88	2.02
Greensboro [1]	do	0	0.67	1.22	0.90	1.79	0.33	0.55	0.05		5.53	0.09	0	T.	0.09	0	0.18
Milledgeville [1]	do	0.20	1.60	1.81	0.90	2.18	1.50	0	0.11		8.00	0.59	0.03	0.34	T.	0.16	1.12
Alapaha [1]	Alapaha	0	0.39	1.45	2.45	4.00	0.72	0	0		9.01	0	0.18	0	0.01	0	0.19
Poulan	Suwanee	0.64	0.45	7.52	2.38	0.47	0.08	0	1.30		12.84	0	0	0	0.34	0	0.34
Quitman [1]	do	0	0.30	0.84	6.32	0.16	0.10	0	0.12		7.84	0.04	0	0.19	0	0	0.23
Valdosta [1]	do	0	0.30	1.10	2.40	1.50	0.30	0	0.50		6.19	0.20	0	0	0	0	0.20
St. George	St. Marys	0.03	0.01	0.06	0.12	T.	0.00	0.00	0.00		0.28	0	0.27	0.61	0.00	0.00	0.88
Tallapoosa [1]	Tallapoosa	0.19	3.59	3.20	1.39	0.63	0.80	0.02	0.29		10.18	0.39	0.08	0	0	0.87	1.34
Thomasville [2]	Ochlockonee	0.03	1.13	3.52	1.91	0.47	0.17	0	0.40		7.71	0	0.58	0.32	0.17	T.	1.07
Waycross [1]	Satilla	0.29	1.10	0.53	1.56	0.71	0.04	0.70	0		4.93	0.03	0.01	0.56	0	0	0.60
Brunswick	Coast	0.24	0.53	0.03	0.51	0.28	0	T.	0.04		1.63	0	0	0	0	0	0

[1] Precipitation measured at 7 a. m.
[2] Precipitation measured midnight to midnight.
Stations without reference mark measure precipitation about sunset.

* Included in following measurement.

TABLE No. 3.—*Daily precipitation, in inches and hundredths, July 5-18, 1916, inclusive*—Continued.

State and station.	Watershed.	5	6	7	8	9	10	11	12	13	Total, 5-13.	14	15	16	17	18	Total, 14-18.
		In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.
South Carolina—																	
Charleston [2]	Coast	0.00	0.00	0.00		T.	T.	0.00	0.08	1.16	1.24	2.13	1.04	0.00	0.00	0.00	3.17
Georgetown	do	0	0	0	0.30	2.00	0	0	0	0.75	3.05	4.75	3.75	0.35	0	0	8.85
Allendale[1]	Savannah	0	T.	0.09	0	0.80	0.32	0.71	0	0	1.92	0.63	0.10	1.10			1.83
Anderson	do	0	0	0	1.61	1.11	0.81	0.15	0.60	0	4.28		1.43	1.99	0.94	0.22	4.58
Calhoun Falls [1]	do	0	0.19	0.11	0.71	0.46	1.19	1.23	0.39	1.72	6.30	0.03	0.22	0.21	0.36	0.99	1.81
Clemson College	do	0	0	0.15	1.64	1.62	0.20	0	0.22	0	3.83	0.03	0.56	0.41	1.54	0	2.54
Edgefield [1]	do	0	0	0	0.88	0.40	0	0	0	0	1.28	0	0.35	0	0	0	0.45
Liberty	do	0	0	0.10	3.04	1.10	0.60	0.04	T.	0	4.88	0.20	0.32	0	0	0	0.52
Meriwether	do	0	0	1.18	0.31	1.22	0	0	0	0.10	2.81	0.34	0.27	T.	T.	T.	0.61
Mountain Rest	do	0	T.	0.45	4.98	4.30	3.35	0.30	0.33	0	13.71	0	0.10	3.80	0.37	0.75	5.02
Walhalla	do	0	0	0.51	2.98	1.22	3.08	0.08	0.12	0.06	7.65	0.04	0.29	1.08	0.02	0.05	1.48
Yemassee [1]	Combahee	0	0	0	0	0.30	0.45	0.22	0.08	T.	1.05	0.05	5.53	0.13	0	0	5.71
Blackville [1]	Edisto	0	0	0.10	0.08	0.20	0.40	0.08	0.30	0	1.06	0	0	0	0	0	0.00
Edisto [1]	do	0	0.13	0	0	1.69	0.66	0.07	0.08	0	2.63	0.44	1.93	0.38	0	0	2.75
St. George [1]	do	0	0	0	0	0.17	0.24	1.17	0	0.17	1.75	0.75	5.50	0.45	0	0	6.70
Aiken	do	0	0.21	0.07	0.11	0.53	0.77	0.13	0	0.37	2.19	0.09	0.11	0	0.04	0.05	0.29
Batesburg [1]	do	0	0	0.49	0	0.50	0.67	0.24	T.	T.	1.90	0.27	1.29	T.	0	0	1.76
Monetta	do	0	0	0	0.15	0.66	0.30	0.04	0	0.42	1.57	0.31	0.08	0	0	0.01	0.90
Trenton	do	0	T.	0.54	0.17	0.26	0.59	T.	T.	0.06	1.62	0	0.68	0	0	0.15	0.83
Summerville	Ashley	0	0	0	0.04	T.	0.50	0	0	0.30	0.84	5.24	1.55	0	0	0	6.79
Pinopolis	Cooper	0	0	0	0	0.48	0	0	0	1.00	1.48	8.70	0.73	0	0	0	9.23
Ferguson [1]	Santee	0	0	0	0	0.07	0.07	0	0.05	0	0.12	2.88	7.52	0.61	0	0	11.01
Rimini [1]	do	0	0	0	0	0.26	0.11	0	0	0	0.37	1.35	2.70	1.30	0	0	4.35
St. Matthews [1]	do	0	0	0	0	1.00	0.65	0	0.10	0	1.75	0.65	1.72	0.45	0	0	2.82
Columbia [2]	Congaree	0	0	0	0.09	1.39	0.33	0.02	0	T.	1.83	1.43	0.34	0	0	0	1.77
Chappells [1]	Saluda	0	0	0	0.05	0.57	0.45	0.38	0	0	1.45	0.08	1.60	0.20	0.27	0	2.25
Greenville [1]	do	0	0	0	0.16	1.34	1.12	0.50	0.02	0.20	3.34	0.01	1.06	3.50	0.38	0.01	4.96
Greenwood [1]	do	0	0	0.31	0.10	0.61	0.24	1.45	0	0.30	3.01	0.05	0.57	0.77	0	0.10	1.49
Little Mountain	do	0	0	0.06	0.90	0.90	0.08	0	0	0.50	2.44	1.00	2.50	0	0	0	3.50
Newberry	do	0	0	T.	0.30	0.90	0.62	0	0	0.05	1.87	0.70	3.10	0.28	0.23	0.01	4.32
Pelzer [1]	do	0	0	0	0.70	1.32	1.02	0.66	0	0	3.70	0.28	0.58	1.84	1.06	0	3.76
Saluda	do	0	0	0.02	0.17	0.50	0.42	0	0.19	0.25	1.55	0.18	0.70	0.07	0	0.03	0.98
Blairs [1]	Broad	0	0	0	0	1.09	0.48	0.13	0	0	1.70	0.25	4.25	0.96	0.37	0	5.83
Gaston Shoals [1]	do	0	0	0	T.	1.34	1.03	0.76	0.22	0	3.35	0.01	3.20	6.42	0.33	0	9.96
Landrum	do	0	0	0	2.05	2.25	1.38	0.21	0.16	0	6.05	0.28	3.10	2.20	1.79	0.07	7.50
Santuck	do	0	0	0	0.37	1.06	0.78	0	0	0.05	2.06	0.60	3.16	0.16	0.26	0.22	4.40
Spartanburg [1]	do	0	0	0	T.	1.08	1.12	0.17	0	0.90	3.27	T.	4.50	3.50	0.50	0	9.00
White Oak	do	0	0	0	0.05	1.97	0.17	T.	0	0.22	2.41	0.90	6.02	0	0.09	0	7.01
Camden [1]	Wateree	0	0	0	0	0.31	0.57	0	0.04	0	0.92	1.10	3.10	0	0	0	4.20
Heath Spring	do	0	0	0	0.15	1.26	0.45	0.38	0	0	2.24	5.27	0.23	0	0	0	5.50
Catawba [1]	Catawba	0	0	0	0	1.70	1.30	0.08	0.08	0	3.16	0	6.60	0.78	0	0	7.38
Winthrop College	do				0.13	1.60	0	0.12	0.46	0	2.30	0.34	4.00	0.12	0	0	4.46
Kingstree [1]	Black				0	0.05	0.15	0	0.60	0	0.80	3.45	12.60	0.72	0	0	16.77
Mayesville (near)	do				0.06	0.08	0.22	0	0	0.27	0.63	6.52	4.18	T.	0	0	10.70
Oaks	do				0	0.13	0.30	0	0	0.35	0.78	8.95	1.00	0	0	0	9.95
Centenary	Great Pee Dee				T.	T.	0.42	0.07	0	0.67	1.16	6.75	1.78	0.02	0	0	8.55
Cheraw [1]	do				0	0.09	0.02	0.03	0	0	0.13	0.33	9.38	0.42	0	0	10.13
Darlington [1]	do				0	0.14	T.	0	0	0	0.14	1.55	10.10	0.88	0	0	12.53
Florence [1]	do				0	0.36	0.05	0	0.20	0	0.61	1.28	9.15	0.66	0	0	11.09
Society Hill [1]	do				0	0.45	0.06	0	0.03	0	0.54	1.92	8.94	0.98	0	0	11.84
Dillon	Little Pee Dee				0.20	0.25	0	0.68	0	0.13	1.26	7.60	0.06	T.	0	0	7.66
Conway [1]	Waccamaw				0	0	1.03	0	0	0	1.03	2.20	2.60	T.	0	0	4.80
Effingham [1]	Lynches				0	0.24	0.33	0	0.15	0	0.72	2.50	13.25	0.60	0	0	16.35
Kershaw	do				0	0.26	0.50	0.63	0	0	1.39	0.21	5.73	0.26	0	0	6.20
North Carolina—																	
(Western district.)																	
Blowing Rock	Great Kanawha		0.00	0.00	0.20	4.50	3.08	0.25	1.05	0.18	9.26	0.30	9.85	6.50	0.00	0.35	17.00
Jefferson	do		0	0	0.20	2.30	2.68	0.19	0.31	0	5.74	0.11	7.35	4.30	0.08	T.	11.84
Transon	do		0	0	0.23	3.15	4.00	0.11	T.	T.	7.49	0	10.65	7.40	0	1.05	19.10
Brewers	Pedee (upper Yadkin)		0	0	0.17	2.90	1.90	0.19	0.45	0.02	5.63	0.50	6.68	3.13	0.42	0.50	11.23
Elkin [1]	do		0	0	0	0.42	2.15	0.30	0	0	2.87	0.24	1.07	1.93	0.31	0.52	4.07
Mount Airy	do		0	0	0	1.85	0.61	0.12	0.03	T.	2.61	0.03	2.95	0.63	0.03	1.41	5.05
North Wilkesboro	do		0	0	0.10	1.90	2.03	0.06	0	0.26	4.35	0.25	9.08	2.38	0	0.25	11.96
Altapass (near)	Santee (Catawba)		0	0.30	1.15	3.30	3.50	0.17	0.30	T.	8.72	0	3.90	19.32	0.55	0.03	23.80
Chimney Rock	do																
Globe (near)	do		0	0	0.97	4.90	2.54	0.30	0	0	8.71	0.35	7.90	10.10	0.38	0.38	19.11
Gorge (near)	do		0	0.06	1.26	4.65	1.89	0.22	0.52	0.10	8.70	0.50	10.02	10.43	0.03	0.45	21.43
Hickory	do		0	0	0.30	1.32	1.47	0.30	0.04	0	3.43	0.19	9.88	3.30	0.02	0.92	14.31
Lenoir	do																
Marion	do		0	0.39	1.22	2.08	3.21	0.41	0	0	7.31	0.26	7.83	5.69	1.14	0.43	13.35
Morganton	do		0	0.10	0.72	1.92	0.68	0.06	0.05	0	3.53	0.05	4.79	0.22	0.28	0.01	10.01
Tryon	do		0	1.45	0	5.10	2.60	0.80	0.10	0.15	10.20	2.17	3.16	7.06	0.05	0.50	12.94
Rock House	Savannah		0.13	0.84	7.08	7.34	2.50	0.80	T.	0.12	18.81	0.12	0.70	5.76	0.68	0.96	8.22
Andrews	Tennessee		0	0.30	1.00	0.95	0.37	0.07	0.15	0.47	3.31	0.07	0.01	1.00	0.02	0.05	1.15
Asheville [2]	do		0	0.10	2.08	1.21	0.41	0.05	0.01	0.04	3.90	0.25	1.50	1.10	0.38	T.	3.83
Banners Elk	do		0	0	0	2.00	2.30	T.	0.38	0	4.68	0.50	7.20	8.66	0.77	T.	17.13
Blantyre	do		0	0.30	1.65	2.35	1.30	0.08	0.15	T.	5.83	0.25	2.85	13.25	0.12	0.80	17.27
Brevard	do		0	0.24	1.78	2.45	1.30	0.05	0.18	0.30	6.30	†	14.70	T.	0.23	14.93
Bryson City [1]	do		0	0	0.18	0.92	0.43	0.10	0.02	0.03	1.68	0	0	0.05	0.20	0.25
Cane River	do		0	0.10	0.81	1.67	0.12	0.07	0.08	0	2.85	0.86	0.18	1.73	1.57	0.07	4.41
Cullowhee	do		0	0.22	0.92	1.32	0.42	0.02	0.10	0.16	3.16	0.01	0.82	1.02	T.	0.18	2.03
Eagle Nest	do		0	T.	1.40	0.76	0.32	T.	0	0	2.48	0.01	0.75	0.65	T.	T.	1.41
Ellijay	do		0	0.06	1.05	1.68	0.85	0.16	0.75	0.02	4.57	0.03	1.68	0.65	0.01	0.83	2.85
Hendersonville	do		0	0.65	1.84	2.40	1.62	0.03	0.23	0.02	6.79	0.22	2.38	9.92	0.02	0.11	12.65
Highlands	do		0	0.55	4.50	7.43	3.44	0.80	0.29	0	17.01	0.05	0.53	5.77	0.63	T.	6.98
Hot Springs	do		0	0	0.82	0.54	0.10	0	0	0	1.46	0	0.12	0.04	0.14	T.	0.26
Marshall [1]	do		0	0	0.20	1.52	0.77	T.	T.	0	2.49	0	0.25	0.69	1.55	0	2.49
Murphy [1]	do		0	T.	1.09	1.49	1.26	0.59	0.65	0	5.08	0.20	0.07	0.07	0.90	0.49	1.73
(Central district.)																	
Lumberton [1]	Lumber	0.00	0.00	0.00	0	0.05	0.25	0.00	0.02	0.00	0.32	0.83	5.00	0.10	0.00	0.00	5.93
Pinehurst	do	0	0	0	0	0	0	0	0	0	0	2.25	0.22	0	0	0	2.47
Sanatorium	do	0	0	0	0	0.93	0.02	0	0	0.02	0.97	2.98	1.70	0	0	0	4.68
Southern Pines	do	0	0	0	0	0.05	0	T.	0	0	0.05	2.25	1.50	0	T.	0	3.75
Albemarle	Pedee (lower Yadkin)	0	0	0	0.18	0.18	0.51	0.15	0	0.03	1.01	0.44	4.70	0.08	0.11	0	5.33
Monroe	do	0	0	0	0.15	0.41	0.35	0.34	0	0	1.25	1.10	4.36	0	0	0	5.46
Rockingham	do	0	0	0	0	0.15	0	0	0	0	0.15	0.18	2.60	0.45	0	0	3.23
Salisbury [1]	do	0	0	0	0.30	0.39	1.55	0	0	0	2.24	0	2.18	1.08	0.10	0	3.36
Settle	do	0	0	0	0.05	2.10	0.67	0.32	0	0	3.14	0.22	3.80	0.90	0	T.	4.92

[1] Precipitation measured at 7 a.m.
[2] Precipitation measured midnight to midnight.
Stations without reference mark measure precipitation about sunset.

† Rainfall not measured until p. m. of the 16th.

TABLE No. 3.—*Daily precipitation, in inches and hundredths, July 5-18, 1916, inclusive*—Continued.

State and station.	Watershed.	July, 1916.															
		5	6	7	8	9	10	11	12	13	Total, 5-13.	14	15	16	17	18	Total, 14-18.
North Carolina—Continued.		*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*
(Central district.)																	
Statesville	Pedee (lower Yadkin).	0	0	0	0.05	1.90	1.52	0.72	0	0.12	4.24	3.52	1.33	0.43	1.62	0	7.02
Winston-Salem [1]	....do	0	0	0	0	0.19	0.23	0.47	0.42	0	0.91	0	0.81	2.63	0.31	0.66	4.41
Caroleen	Santee	0	0	0.31	0.43	2.00	0.38	0.08	0.63	0	3.83	0.13	8.00	2.55	0	0.02	10.68
Charlotte [2]	....do	0	0	0	0.20	2.57	0.17	T.	0	0	2.94	0.53	4.61	0.01	0	T.	5.15
Kings Mountain	....do																
Lincolnton	....do	0	0	0	0.30	0.90	0.40	0.62	T.	T.	2.22	0.21	10.00	0.95	0.35	0.62	12.13
Mount Holly [1]	....do	0	0	0	0	0.58	1.42	0.52	0	0	2.52	0	2.10	1.35	0.13	0	3.58
(Eastern district.)																	
Beaufort	Coast	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02
Edenton	....do	0	0	0	0	0	0	0	0	0	0	0	0	0	T.	0	T.
Hatteras [2]	....do	0.01	0	0	0	0	0	0.13	0	0	0.17	0	T.	0	0	T.	T.
Manteo	....do	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.04	0.04
Swan Quarter	....do	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0.04
Wenona	....do	0	0	0.35	0	0.10	0.12	0	0	0	0.57	0	0	0	0	0	0
Belhaven	Pungo	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0.40	0	0.65
Bolton	Waccamaw	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eagletown	Chowan	0	0	0	0.48	0.08	T.	0	0	T.	0.56	T.	0	0	0	0	T.
Elizabeth City	Pasquotank	0	0	0	0	0.15	0	0	0	0	0.15	0	0	0	0	0	0
Elizabethtown [1]	Cape Fear	0	0	0	0	0.25	0.95	0	0	0	1.20	1.10	1.25	0	0	0	2.35
Fayetteville [1]	....do	0	0	0	T.	0.50	0	0.39	0	0	0.89	0.03	1.20	0	0	0	1.23
Chapel Hill	....do	0	0	0	0.02	0.03	0.18	0	0.16	0	0.42	0.17	0.34	0.02	0.18	0	0.71
Graham [1]	....do	0	0	0	0	0.03	0.11	0.05	T.	0	0.19	0	0.96	0.08	0.39	0	1.43
Lillington [1]	....do	0	0	0	0	0.32	0	0.04	0	0	0.36	0	0.40	0	0	0	0.40
Monture [1]	....do	0	0	0	0	0.16	0	0.05	0	0	0.21	0	0.51	0	0.10	0	0.61
Randleman [1]	....do	0	0	0	0	0.10	0.20	0	0	0	0.30	0	0.25	0.30	1.30	0	1.85
Sloan	....do	0	0	0	T.	0.17	0.04	0	1.27		1.48	0	0.05	0	T.	0	0.05
Southport	....do	0	0	0	0	0	0	0	0	0	0	0.68	0	0	0	0	0.68
Reidsville [1] (Roanoke River)	....do	0	0	0	0.02	0.27	0.20	0.03	0	0	0.52	0	0.74	0.27	0.17	0.10	1.28
Willard	....do	0	0	0	0.35	0.07	0	0	0	0	0.42	0.74	0	0	0	T.	0.74
Wilmington [2]	....do	0	0	0	0.20	0.08	0	0	0.13	0	0.41	0.55	0	0	0	T.	0.55
Greensboro [1]	....do	0	0	0	0.05	0.08	0.95	0.18	0	0	1.26	0	0.78	0.80	0.15	0	1.73
Enfield (near) [1]	Tar	0	0	0	0	0.75	0.27	0	0	0	1.02	0	0.62	0	0	0	0.62
Greenville [1]	....do	0	0	0	0	0.02	0.13	0.01	0	0	0.16	0	0	0.74	0	0	0.74
Louisburg [1]	....do	0	0	0	0	0.80	0	0.46	0	0	1.26	0	0	0	0	0	0
Nashville [1]	....do	0	0	0	0	0.65	0.16	T.	0	0	0.81	T.	0	0.10	0	0	0.10
Rocky Mount [1]	....do	0	0	0	0	0.20	0.10	T.	T.	T.	0.30	T.	0	0	0.42	0	0.42
Scotland Neck	....do	0	0	0	0.87	0	0	0	0	0	0.87	0.20	0	0	0	0	0.20
Tarboro [1]	....do	0	0	0	0	0.21	0	0.16	0	0	0.37	0	0.16	0.08	0	0	0.24
Henderson	Tar and Roanoke	0	0	0	0.25	0	0.27	0	0	0	0.52	T.	0.13	T.	0	0	0.13
Weldon [1]	Roanoke	0	0	0	T.	0.68	0.37	0	0	0	1.05	0	T.	0.07	0.03	0.01	0.11
Durham (near)	Neuse	0	0	0	0.12	0	0.50	0	0	0	0.62	0.34	0.20	0.08	0.07	0	0.69
Goldsboro [1]	....do	0	0	0	0.01	1.09	0.02	0	0	0	1.12	0.01	0.52	0	0	0	0.53
Kinston	....do	0	0	0	0	0.08	0	0	0	0	0.08	0.22	0.18	0	0	0	0.40
Neuse [1]	....do	0	T.	0.17	0	0.76	0	0	0	0.38	1.31	0	0.06	0	0	0	0.06
Newbern [1]	....do	0	0	0	0	0.05	0.41	0.04	0	0	0.50	0.11	0.05	T.	0.04	0	0.20
Raleigh [2]	....do	0	0	T.	0.08	0.04	0.36	0	0	0	0.48	0.70	0.12	T.	0.02	0	0.84
Rougemont [1]	....do	0	0	T.	0	0.20	T.	0.30	0	0	0.50	0.40	T.	0	0	0	0.40
Smithfield [1]	....do	0	0	0	0	0.60	0	0	0	0	0.60	0	0.67	0	0	0	0.67
Tennessee—																	
Bluff City [1]	Tennessee	0.00	0.00	0.00	0.82	0.74	0.00	0.00	0.24	1.80		0.00	0.00	0.78	1.65	0.02	2.45
Charleston [1]	....do	0	0.08	1.20	2.00	2.00	0.80	0.10	T.	6.18		0.03	0	0	0.90	0	0.93
Chattanooga [2]	....do	0.06	1.56	4.84	2.74	0.91	0.72	0.38	0.55	11.76		0	0	0.03	0.09	0.13	0.25
Lookout Mountain [1]	....do	0	0.42	4.08	5.34	3.98	0.96	0.08	0.38	15.24		0.29	0	0	0	0.48	0.77
Clinton [1]	....do	0	T.	2.35	0.60	1.15	T.	0.15		4.25		0.15	0.05	0.85	0.20	T.	1.35
Copperhill [1]	....do	0.11	1.00	1.77	0.82	0.69	0.38	0.01	0	4.78		0	0	0.78	0.32	0.83	1.93
Dandridge [1]	....do	0	0	0.04	1.20	1.30	0	0	0.32	2.86		0	0	0.74	0	0	0.74
Decatur	....do	0	0.21	1.71	2.01	1.15	1.18	0.01	0.03	6.30		0.03	0	1.30	0.01	0.02	1.36
Dunlap	....do	0.08	0.70	*	*	*	3.50	0.20	0	4.48		0.20	0	0.30	0.03	0.10	0.63
Elizabethton [1]	....do	0	0	0	1.02	0	0	0	0	1.02		0	T.	0.85	0.96	0.11	1.92
Jefferson City	....do	0	0.11	1.56	0.61	0.35	0	0	0	2.63		0.32	0	1.33	0	0.04	1.69
Johnson City [1]	....do	0	0	0	0.70	0.67	0.04	0.03	0	1.44		0.01	0.02	0.72	2.00	0.05	2.80
Kingston [1]	....do	0	0	0.12	2.06	1.40	0.38	0.52	0	4.48		0.25	0.17	2.05	0	0.02	2.49
Knoxville [2]	....do	0	T.	0.89	0.61	0.13	0.17	0	0.01	1.81		0.01	0.25	1.31	1.02	0.13	2.72
Loudon [1]	....do		0	0.18	1.58	0.88	0.15	0.07	0	2.8		0.42	0	0.28	0.29	0	0.99
McGhee [1]	....do		T.	.25	1.70	0.90	0.13	0.06	0.14	3.18		0	0.18	0.10	T.	0	0.28
Mountain City	....do		0	0.30	0.12	0	0	0	0	0.42		0	1.75	3.00	0.50	0	5.25
Newport [1]	....do		0	T.	1.30	0.30	0	0	0.50	2.10		0.20	0.30	0.04	0.08	0	0.62
Rogersville [1]	....do		0	T.	1.79	0.48	0	0	0.19	2.46		0	T.	0.57	0.30	0.08	0.95
Sevierville	....do		0	0.93	0.37	0.13	0	0.29	0.16	1.88		0.33	0	1.22	0.05	0	1.60
Tazewell [1]	....do		0	0	1.85	0.34	0.10	0	0	2.29		0	0.23	1.63	0	0.26	2.12
Palmetto	....do		1.62	3.00	1.22	0.20	0.42	0.05	1.20	7.71		0	0	0	0	0.90	0.90
Carthage [1]	Cumberland		0	0.08	2.24	0.50	0.19	0.71	0.95	4.67		3.44	0.04	0	0	0.02	3.50
Cross Ille	....do		0.21	3.25	2.40	0.20	0.81	0.11	0.11	7.09		0.10	T.	0.92	0.01	0	1.03
McMinnville	....do		0.60	2.60	1.32	0.95	0.82	0.11	0.76	7.16		0	0	0	0	0.33	0.33
Nashville [2]	....do		1.62	3.00	1.22	0.20	0.42	0.05	1.20	7.71		0	0	0	0	0.90	0.90

[1] Precipitation measured at 7 a. m.
[2] Precipitation measured midnight to midnight.
Stations without reference mark measure precipitation about sunset.

* Included in following measurement.

TABLE 4.—*Daily gage heights on principal rivers of the East Gulf and South Atlantic States, in flood during July, 1916.*

Stations.	Rivers.	Flood stage.	5	6	7	8	9	10	11	12	13	14	15	16	17	18
		Feet.	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*
Merrill, Miss.	Pascagoula	20	5.2	13.7	19.7	26.0	a 26.6	25.3	23.9	22.9	22.0	21.4	21.0	20.7	20.2	19.7
Aberdeen, Miss.	Tombigbee	33	2.8	2.8	12.2	27.0	33.6	36.7	b 36.4	36.2	35.5	34.3	33.3	32.1	30.6	29.5
Columbus, Miss.	do	33	-0.5	-0.5	7.5	17.0	22.7	24.8	c 27.2	31.0	31.3	30.0	29.0	28.0	26.5	24.8
Cochrane, Ala.	do	41	4.0	4.2	14.0	25.5	30.0	32.0	33.8	35.7	37.0	39.2	40.0	40.0	39.3	38.5
Demopolis, Ala.	do	35	9.4	10.2	23.5	43.1	49.5	51.5	53.5	56.3	62.3	65.5	66.2	66.1	65.8	65.4
Tuscaloosa, Ala.	Black Warrior	43	8.1	8.7	40.4	d 65.5	66.1	64.8	63.8	61.3	58.3	54.8	51.0	46.3	41.4	42.3
Rome, Ga.	Coosa	30	6.4	6.4	6.6	6.4	12.0	26.6	32.4	33.0	e 34.1	31.8	27.5	26.0	23.4	20.6
Gadsden, Ala.	do	22	3.1	2.8	7.4	11.4	22.7	26.4	27.8	28.6	29.8	30.7	f 31.4	31.2	30.4	28.8
Wetumpka, Ala.	do	45	1.3	4.2	28.0	g 51.4	49.2	49.4	51.0	51.0	50.4	49.0	47.0	46.0	45.6	44.4
Millstead, Ala.	Tallapoosa	40	3.6	2.8	27.0	38.2	39.8	39.4	37.6	34.2	26.2	19.7	14.6	20.2	16.2	10.4
Selma, Ala.	Alabama	35	2.9	3.4	10.4	32.3	43.9	49.9	52.0	52.9	53.4	53.9	53.9	53.4	52.9	52.0
Bainbridge, Ga.	Flint	25	4.0	4.3	4.3	4.6	15.1	24.2	27.9	28.7	28.7	28.2	27.5	27.6	28.1	28.2
Alaga, Ala.	Chattahoochee	20	3.3	3.6	3.8	32.8	h 43.7	42.9	42.0	41.2	40.7	39.6	37.7	34.5	29.5	20.4
Catawba, S. C.	Catawba	11	4.3	4.1	3.9	3.4	4.5	7.0	12.0	15.6	9.0	6.0	10.8	26.0	*i 35.0	20.0
Mount Holly, S. C.	do	15	3.8	3.0	2.9	2.6	3.6	4.8	9.4	9.3	5.4	3.0	6.0	*23.5	j 45.0	21.0
Camden, S. C.	Wateree	24	16.2	10.4	8.4	7.2	6.8	14.0	21.6	27.3	27.3	21.6	28.9	26.6	27.6	k 40.6
Chappels, S. C.	Saluda	14	5.0	5.0	4.4	4.3	3.0	4.0	10.1	13.0	14.5	14.2	8.4	12.5	15.4	17.4
Blairs, S. C.	Broad	14	5.7	5.6	5.4	5.4	6.1	7.8	11.5	12.4	8.0	7.2	14.2	l 20.0	35.5	28.7
Columbia, S. C.	Congaree	15	4.0	1.9	1.9	1.7	1.1	1.8	6.7	10.0	7.1	5.4	9.5	20.5	m 30.9	29.7
Rimini, S. C.	Santee	12	9.2	11.5	11.4	10.6	9.7	8.1	9.6	12.4	12.9	13.3	13.5	14.2	11.9	18.7
Cheraw, S. C.	Great Pee Dee	27	5.2	11.3	7.8	6.2	5.0	4.4	4.0	17.2	17.5	11.1	18.3	33.0	35.1	33.7
Effingham, S. C.	Lynches	14	4.8	4.3	5.3	5.8	5.0	4.4	3.0	2.6	2.3	2.5	17.0	17.8	18.5	17.1
Kingtree, S. C.	Black	12	1.3	1.1	1.1	1.2	1.1	0.9	0.9	1.4	1.2	1.9	12.4	14.3	q 15.4	14.8
Radford, Va.	New	14	0.5	0.3	0.3	0.3	0.3	0.7	5.3	2.5	1.3	1.0	1.2	r 32.0	10.0	9.0

Stations.	Rivers.	19	20	21	22	23	24	25	26	27	28	29	30	31	Above or below previous high.
		Feet.	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*
Merrill, Miss.	Pascagoula	18.9	18.4	19.1	19.4	19.4	19.2	19.3	19.7	19.7	19.6	19.2	18.6		+ 0.8
Aberdeen, Miss.	Tombigbee	27.8	26.8	25.7	23.9	21.8	19.7	15.8	13.8	10.7	7.2	4.6	3.8	4.1	- 3.2
Columbus, Miss.	do	23.0	22.0	21.0	19.7	18.2	16.7	14.2	10.2	6.7	4.5	2.8	2.3	1.8	-10.5
Cochrane, Ala.	do	37.8	37.0	36.3	35.8	34.9	33.9	33.3	30.8	28.2	23.9	18.4	10.3	8.3	- 7.0
Demopolis, Ala.	do	64.9	64.8	64.6	64.2	63.6	62.6	61.2	60.9	60.3	59.0	57.6	55.8	52.4	- 6.7
Tuscaloosa, Ala.	Black Warrior	41.0	49.8	48.0	42.9	37.6	35.0	31.4	27.8	25.0	22.1	18.8	16.0	15.0	- 2.3
Rome, Ga.	Coosa	14.7	15.3	13.5	18.3	17.8	15.3	13.0	12.0	16.2	10.7	9.7	8.8	8.6	- 6.0
Gadsden, Ala.	do	27.5	26.0	23.6	20.0	18.6	19.5	19.0	17.4	13.6	9.7	8.2	7.3	6.3	- 5.2
Wetumpka, Ala.	do	44.0	44.5	45.0	41.6	39.0	35.6	33.0	31.0	29.0	26.5	21.5	16.5	14.5	-10.2
Millstead, Ala.	Tallapoosa	7.2	19.2	20.4	17.2	17.0	14.8	12.2	10.2	14.2	12.0	11.0	9.2	8.0	- 8.4
Selma, Ala.	Alabama	51.1	50.3	50.1	50.0	49.4	48.4	46.6	44.0	41.4	38.2	34.6	28.5	23.0	- 3.1
Bainbridge, Ga.	Flint	27.6	26.4	25.0	23.6	22.0	20.7	20.2	20.6	21.6	23.0	24.1	24.6	24.5	- 5.9
Alaga, Ala.	Chattahoochee	19.7	22.0	22.0	21.5	23.9	25.2	28.0	26.6	24.5	21.4	17.5	15.6	13.9	+ 3.8
Catawba, S. C.	Catawba	12.0	8.0	6.9	8.5	15.0	12.0	15.0	10.0	7.0	6.0	5.0	4.0	4.0	+12.0
Mount Holly, S. C.	do	10.0	4.6	1.6	3.8	4.0	4.8	4.6	4.0	4.3	3.2	3.0	3.0	2.8	+22.5
Camden, S. C.	Wateree	38.0	30.5	23.0	27.5	29.0	28.5	30.0	29.5	26.6	24.5	22.5	20.0	19.5	+ 3.3
Chappels, S. C.	Saluda	18.8	13.2	16.0	13.5	15.6	17.6	16.4	14.2	13.5	12.4	11.5	7.4	6.9	-15.9
Blairs, S. C.	Broad	18.0	13.5	13.0	12.8	15.8	13.2	13.9	10.2	8.8	7.3	7.1	6.6	6.2	+ 4.5
Columbia, S. C.	Congaree	22.4	14.6	11.9	11.6	14.8	15.7	15.5	12.9	9.6	9.7	7.5	9.0	6.5	- 4.3
Rimini, S. C.	Santee	30.1	o 35.0	d 33.5	ø 31.0	28.8	26.1	23.9	23.0	22.8	22.6	21.8	20.5	19.1	+ 2.2
Cheraw, S. C.	Great Pee Dee	n 36.1	35.6	37.2	26.2	27.6	30.9	30.9	32.4	30.2	25.5	21.5	19.8	20.6	- 7.9
Effingham, S. C.	Lynches	16.5	18.3	17.5	16.0	15.0	14.4	13.5	13.1	14.2	13.8	14.3	16.2	16.0	- 1.3
Kingtree, S. C.	Black	13.9	12.1	13.0	12.6	12.2	11.9	11.7	11.8	12.8	13.3	14.0	14.1	13.7	+ 1.0
Radford, Va.	New	4.5	3.5	3.0	2.6	2.0	2.0	1.8	1.5	1.3	4.5	2.6	2.0	2.0	- 2.0

a 27.0 at 7 p. m.
b 36.8 at 12:25 p. m.
c 31.5 later in the day.
d 66.3 at about 6 p. m.
e 34.3 at 6. p. m.
f 31.5 at 3 p. m.
g 51.5 at 3 p. m.
h 44.0 at 9 a. m.
i 40.4 at 7:45 p. m., estimated.
j 45.5, estimated, during a. m.
k 43.0, estimated, during p. m.
l 35.8 at about 12 o'clock night.
m 31.5 at 11:30 a. m.
n 36.0 at 1 p. m., estimated.
o 36.4 at 2 p. m.
p 18.7 at 2:15 p. m.
q 15.5 at 12 noon.
r 32.0 at noon, estimated.

*Gage washed away: readings on subsequent dates estimated.
ø Estimated; gage overtopped.

MEAN LAKE LEVELS DURING AUGUST, 1916.

By United States Lake Survey.

[Dated Detroit, Mich., Sept. 5, 1916.]

The following data are reported in the "Notice to Mariners" of the above date:

Data.	Lakes.			
	Superior.	Michigan and Huron.	Erie.	Ontario.
	Feet.	*Feet.*	*Feet.*	*Feet.*
Mean level during August, 1916:				
Above main sea level at New York	603.73	581.04	572.80	247.36
Above or below—				
Mean stage of July, 1916	+0.08	-0.12	-0.44	-0.57
Mean stage of August, 1915	+1.37	+0.94	+0.49	+1.93
Average stage for August, last 10 years	+1.16	+0.21	+0.20	+0.87
Highest recorded August stage	-0.20	-2.47	-1.31	-0.90
Lowest recorded August stage	+2.13	+1.19	+1.42	+3.01
Average relation of the August level to—				
July level	+0.2	0.0	-0.1	-0.3
September level	0.0	+0.2	+0.3	+0.4